COAL AGE

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"Money calls, but does not stay;
It is round and rolls away."

As poetry, this may pass as a complete picture, but if you reduce it to prose, you'll probably find that a thing can't roll far unless it is furnished with something to roll on.

A tabulation of the average earnings of miners at some camps would suggest that there must be many satisfactory savings accounts at nearby banks. Further inquiry along the same line is apt to start you wondering how all that money gets sidetracked, somewhere between the pay-envelope and the bank. A little investigation as suggested above, is certain to reveal some surprising facts, and if you think these require justification, just remember that any workingman who finds his purse empty at the end of a hard month's labor, is easy prey for the fellow who would exploit him.

One general superintendent, having noticed a conspicuously prosperous looking check clerk from one of his camps, in town pretty often, decided upon a little investigation of his own. The source of the prosperity was soon disclosed.

About once a week, this clerk conducted a raffle: A cow, a gun, a horse, a watch, anything for variety; there was little variation, however, in the final result—he always pocketed about $20. Absurd you say; wait a minute. This clerk was a very obliging fellow. When a miner came to his window for a check, he footed up his debits and credits with painstaking care, and if the case looked doubtful, he gave the miner the benefit of the doubt. Most any other clerk would have said, "You'll have to wait until to-day's sheet comes in." The next time that miner came to the window the clerk would offer him a raffle ticket; of course the miner would not refuse to take it. This clerk was not dishonest—he was only sidetracking some of the dollars.

At another mine, a superintendent began to wonder how one of his mine foremen was able to annex so much real estate to his holdings. A little inquiry uncovered a "loan-shark system," well organized, and growing. The improvident are willing to pay two dollars for the use of one any time, if they really decide that they must have money. This foreman always had the coin, also managed to collect the debt when it became due; the improvident one is generally timid, and is never anxious to fall out with the mine foreman. "Loan Sharks" of this type have been known to accumulate much money, under less favorable circumstances. If you are not familiar with the full significance of the term "Loan Shark," the welfare of your men is in danger.

At some mines, where the commissary is a part of the system, a plan has been devised that makes it possible for the man with ready money to patronize the company store, pay full prices and yet escape any overcharge. The commissary manager allows these customers to buy scrip at a discount from the miners, and use it at its face value in paying for merchandise. By this system, the commissary draws additional trade, the favored few obtain their goods at a most reasonable figure, and the miner—well, he has been permitted to sidetrack about 25 per cent. of his earnings.

We suggest that you do a little investigating yourself, if you have the happiness and prosperity of your men at heart.

IDEAS AND SUGGESTIONS

A Good Coal-Mine Superintendent

By West Virginia Engineer

"Wanted: A good superintendent, capable of producing a large tonnage."

And what constitutes a good superintendent?

Evidently from the want advertisement above, the answer is—a man capable of producing tonnage. However, such a man might fulfill the requisition without being a good superintendent.

We have in mind a fellow who opened a mine, and from the start his tonnage increased rapidly with a correspondingly low cost. To an outsider, and no doubt to the mine owner, this man was a success.

He decided suddenly to resign. The next man to take his place found ample reasons for his predecessor's resignation: the mine was on the squeeze! Inquiry disclosed the fact that in getting out tonnage, this man sacrificed good mining principles to do so. He would go into the mine in case a new man or any man needed a place and order the mine foreman to continue rooms through a barrier intended to protect the next room heading, until he finally had his protection pillars cut to pieces.

A Low-Cost Superintendent

A low-cost superintendent also can get his mine in just as poor condition by lack of judgment in furnishing supplies. This applies particularly to mine props and overhead timbering.

A mine foreman must keep his working places properly timbered, otherwise there will come a time when these same places will need cleaning up and retimbering in order to recover his pillars.

Have you ever noticed that as a general rule the exceptionally low-cost superintendent is always followed by an increased cost with the next man? Either that, or worse follows worse.

The superintendent of today must be a man of judgment. If his mine foreman comes to him with a requisition for supplies he should be familiar enough with the situation to either grant or refuse the request with some degree of wisdom.

He should be a man capable of keeping data on an experimental operation at his mine in order to decide whether or not it is a success. Take, for instance, the laying of wood or steel rail in a room, can your superintendent give you the advantages of one over the other? Can he tell you how many times the driver has been off the wood track while the room was being driven, and how few times he has been off the steel-rail track while driving a parallel room? Can he tell you the car efficiency of his mine, that is, how many trips per car per day are made?

Facts and figures are the most convincing arguments we have; they are the foundation of efficiency. A superintendent need not be an engineer to work out these matters just because they are called efficiency engineering.

Superintendent Must Be a Diplomat

A superintendent is necessarily a sociologist or a diplomat, as you choose to call him.

The foreign element, on whom we must rely principally for our mining population, must be studied and classified. Their whims, ideas, previous environment and many other points about the foreigners must be recognized in order to successfully draw from them the desired results.

It seems to me that the unsophisticated foreigner is much like a small boy. He is not merely a physical organism, but a sentient, self-conscious being; and so he cannot be cut, trimmed, trained and fed to perfection like a plant, with no regard to himself. He should be considered as a bundle of emotions, rather than a physical mechanism, and the point will be clear—that whatever must be done for him, the first thought must be for the effect on his emotions, or the best laid plans will go amiss.

The large coal companies realize that it is not only the acquisition, but the retention of men as well, that they must solve.

The superintendent is the "man on the job," and it rests principally with him to solve these problems.

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Some Remarks without a Moral

By Southern Manager

"You'll be damned if you do and you'll be damned if you don't." The man who first vouched for the truth of that statement probably wasn't familiar with the various pay-roll deductions, familiarly known as cut-outs, that the present-day coal-mine superintendent is expected to maintain if he desires to keep the good will of his management and his men; but he knew human nature pretty well.

Our friend, the superintendent, was just cooling off after partaking of a rather heated interview with his school board, when we butted into his office. Naturally we allowed him to do most of the talking.

"Yes, it's all chargeable to that everlasting bugaboo, the cut-out system. We cut the men for doctor, and blacksmith, and check weighman, and school teacher, and charity lists, and any other old list with their consent, and then let them growl at us—consent or no consent. Take, for example, the physician list and the school-fund list. The men elect the doctor and the school teacher and we deduct a fixed amount from each man's pay envelope to pay them.

"During some of the months when our pay-roll is large, the doctor and school funds assume considerable proportions. If we give all of the collections to the doctor and teacher the men grumble and insist that they do not earn such enormous salaries. If we hold back part of the fund and refurnish our hospital or school house or do similar work for the common good, they grumble louder because we have confiscated their money. If we

hold the money in a reserve fund to tide over future lean periods, we are asked constantly to make an accounting.

"Often there are two or more factions to contend with. The doctor or teacher who suits the majority does not suit the minority and the minority lose sleep trying to uncover or discover something that will justify their coming to me with a petition demanding the summary dismissal of the offending party. Even if their efforts along those lines are successful they are not satisfied, but they begin to question the acts of the member of the majority who is unfortunate enough to be acting as treasurer of the funds.

The Superintendent Had to Pay

"Once, in order to settle a row, I was simple enough to volunteer as treasurer myself; it came mighty near costing me $75 per month for 8 months. We had a teacher who was not giving satisfaction and the majority insisted that she be discharged. As the camp was pretty evenly divided into two factions, I decided that harmony could best be restored by getting another teacher, so I prevailed upon most of the men to accept a new teacher. At the close of the year the teacher, whom I had dismissed, entered suit against me as treasurer for breach of contract and her attorney produced a properly executed contract that had been signed by the school committee at the beginning of the school year. The treasury was empty (this had been one of the lean years), so I was mighty glad to compromise the case out of court.

"If it so happens that the men are all satisfied with the presence of a camp physician paid by cut-outs, it more than often happens that the company has cause not to be.

"Take, for example, the ever-recurring fake damage suit. If the testimony of the camp physician is not favorable to the party who is trying to recover damages, he has little trouble in convincing the jury that the physician should be classed as a company employee, drawing a fixed amount every month collected by the company, and as such is more than apt to be prejudiced against one poor man who can be of no further benefit to the physician, if by so doing the latter can strengthen his position with the company.

"What's the moral? I haven't been able to find it."

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Man-Failure

A distressing train of events in the affairs of a big railroad recently led to an exhaustive investigation at the hands of a commission. In making its final report this commission was responsible for the coinage of a new word—"man-failure." To this was attributed the conditions leading up to and allowing of the train of mistakes and disasters which the commission was required to investigate. And although the final report was a lengthy one, the entire chain of deplorable events was attributed to only one general cause, "man-failure."

It is not an everyday thing that so striking a word as "man-failure" is coined or brought so forcibly to our attention. We may wonder how many erroneous polices and serious blunders in operation and management have been explained in some way as due to unfavorable conditions, etc., when "man-failure" was really at the bottom of things. In our own business, coal mining, we do not need to doubt that many ruinous policies have been enforced with serious results, all of which should have been charged to the failure of high officials, directors, etc., because they either did not see that the policies they outlined were safe, or if they knew they were, did not follow them up to see if they were carried out. We can easily recall strikes which were caused by "man-failure" on one side or the other.

Here are a few kinds of "man-failure" in connection with coal-mining work:

A man is made general manager of a company owning several big mines, where pick mining exists. He is a believer in machine-mined coal. Machines are introduced and the men are forced to work them in good places and bad at a rate of differential that is not wholly fair to them. After expending large sums of money on power house, mining machines and other equipment, it is finally found that machine mining is not as profitable to the company as was the pick mining. The "G. M." explains it by showing up the unfavorable attitude of the men and the fact that the inside conditions in some places were against it. And although he may get away with such an excuse, it was really a clear case of man-failure, due to his not studying conditions carefully enough and in fixing the differential incorrectly.

A superintendent allows a "Ring," consisting of perhaps his assistant, one or two foremen, and a few favored men, to exist in his division. They are all capable men, but their ring tactics breed trouble and lead to conditions that the "super" has finally to answer for. It is man-failure on the part of the superintendent to allow rings to exist.

Instructions by Circular Letter

A general superintendent believed too strongly in continually issuing instructions by circular letter and in picking up flaws and small mistakes. He kept his local superintendents so busy answering his letters they could not find time to attend to larger matters of operation, cost, etc. The result was the management finally took up the question of cost, but it was too late.

A mine foreman who had a splendid reputation as a hard worker and all-round good man began work for a progressive company, whose motto was "safety first." But the foreman didn't like "new-fangled notions." He looked after his mine faithfully, the output was good and the cost was right; but he would not follow safety instructions, so finally lost out. It was man-failure on his part in not keeping abreast of the times.

It is all too common for a wealth of instructions to be issued by officials in charge who do not follow up their work to see if rules and instructions are being worked out. Dead rules are dead weight. We should all remember that only 10 per cent. of the work is done by issuing instructions, 90 per cent. is getting them carried out.

We can't afford to overlook the significance of man-failure. In future it will more often be given as a reason for failure because we are growing more frank in our explanation of mistakes.

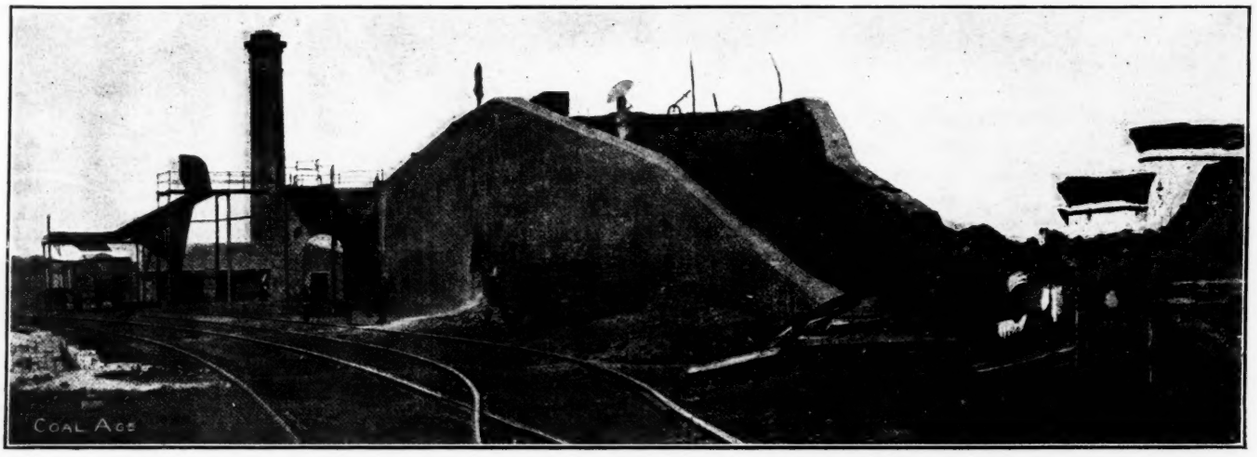
Do you give instructions? By all means follow them up and make sure they are carried out. Do you receive instructions? Don't fail to study them carefully to find their meaning. Then, be sure to carry them out. These two simple rules will go a long ways toward avoiding man-failure.

The Coal Fields of British India

SYNOPSIS—The coal fields of India while not covering a large area have in places many superposed seams of great thickness, and the fuel is low in sulphur, which, on the whole, is generally true of Asiatic coals.

The coal seams of India occur in deposits more recent than those in which the principal coal fields of Europe are found. With one or two unimportant exceptions the peninsular fields are confined to the great Gondwana (Permo-Triassic) system of Indian geologists. It is thought that the rocks of this period were almost entirely deposited in fresh water and probably by rivers. As a rule they are found occupying basin-shaped depressions in the older formations, and such depressions frequently coincide with the existing river valleys.

In general the coal of peninsular India may be described as a laminated bituminous coal, in which dull and bright layers alternate. Much of it does not coke freely, while a not inconsiderable portion will not do so at all. However, from the coal of particular seams in the Raniganj, Karharbari and Jharia fields, fairly good qualities of coke can be made. In the Raniganj field the best coke has been made from the Sanctoria coal and in the Jharia field from Nos. 14, 15 and 17 seams.



INCLINE, DISHARGARH COLLIERY, RANIGANJ COAL FIELD, BENGAL, INDIA

FIXED CARBON, ASH AND MOISTURE

The average proportion of fixed carbon in the coal of the Raniganj field is under 55 per cent., while in the Karharbari and Jharia fields it is probably about 10 per cent. higher. There is no case of a true anthracite having been discovered in any of these fields; but the crushed and powdered coal at the foot of the Darjiling Himalayas approximates in character to anthracite on account of the removal of its original volatile constituents.

The percentage of ash in Bengal coal which is brought to market averages from 10 to 15, that is to say, that coal with less than 10 per cent. ash does not commonly occur, and coal with more than 15 per cent. does not, as a rule, find a ready sale. In the producing fields of Hyderabad, the Central Provinces and Central India, the ash content is much higher, particularly in the latter provinces, where the ash varies from 15 to 25 per cent.

The moisture or hygrometric water varies much in the coals from the different fields. In those of the Godavari and Wardha areas it is exceptionally high, being often 14 per cent., while in the Raniganj field it varies from 1 per cent. in the Barakar or lowest formation to 3.81 in the lower Raniganj seams and 6.86 per cent. in the upper seams of the Raniganj formation. A similar proportion appears to obtain in the corresponding stages of the Jharia field.

SULPHUR AND PHOSPHORUS

The quantity of sulphur and phosphorus varies much from seam to seam, and though large quantities of these impurities are often found some of the coal is sufficiently free of them for the manufacture of iron and steel. The average of 31 analyses of coals from Raniganj made by Tween gave sulphuric acid 0.07 per cent.* and phosphoric acid 0.14 per cent.

Dunstan gives the following analyses of Raniganj, Jharia and Giridih coals:

Coalfield	Phosphorus, per cent.	Sulphur, per cent.
Raniganj (average of 34 samples)	0.088	0.74
Jharia (average of 12 samples)	0.143	0.80
Giridih (average of 6 samples)	0.019	0.62

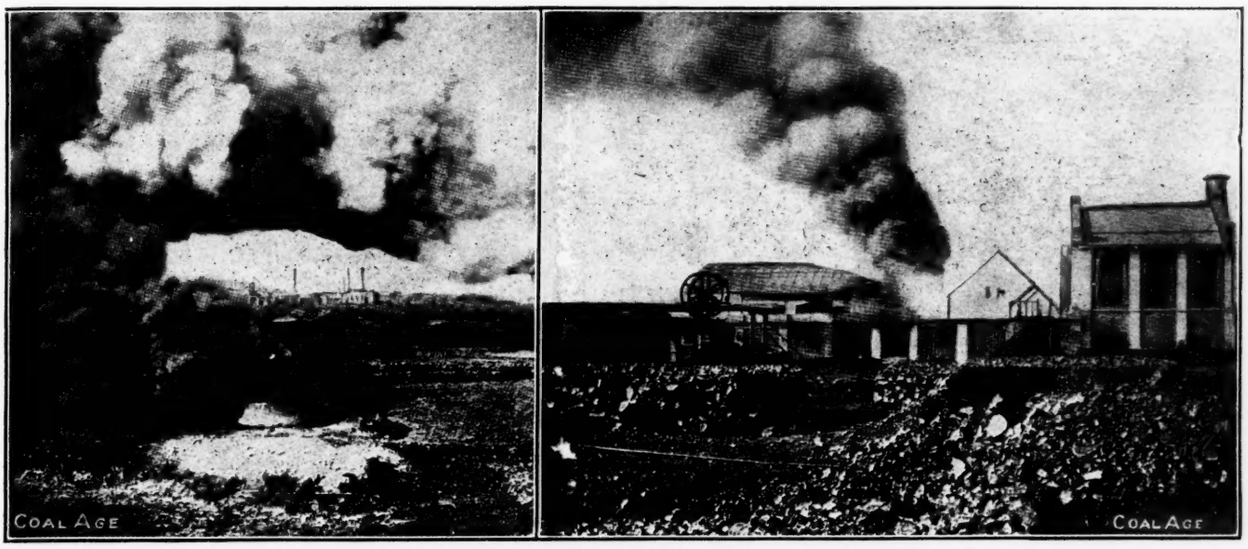
COALS ABOVE THE PERMO-TRIASSIC SYSTEM

Coal of Upper Jurassic age occurs in Kutch. The workings at Trombow are apparently the largest, where a seam, measuring 16 in., contained only 8 in. of good coal, the remainder being shale. The seams appear to be so thin and inconstant and the coal so brittle and intermixed with shale that they cannot be considered of any economic importance.

Coalfields of Cretaceous age are found in the Khasia and Garo hills in Assam. Coal of Tertiary age is found in the foothills throughout almost the whole of extra-

Note—Abstracted from "Memoirs of the Geological Survey of India" written by V. Ball and revised and largely rewritten by R. R. Simpson, inspector of mines.

*This figure appears to be very low and possibly should be 0.7 per cent., the value given in the table below for the sulphur only.



FIERCE FIRE IN THE RANIGANJ COAL FIELD, BENGAL, INDIA

Underground Fire, Charanpur Colliery — Burning Coal Shaft, Charanpur Colliery

peninsula India, from Baluchistan on the northwest to Assam on the northeast. It also occurs in Sind, Rajputana, Burma and in the Andaman and Nicobar Islands. In upper Assam, however, important deposits of true coal are found, which are considered to be of middle Tertiary, probably Miocene, age.

Generally speaking, the Tertiary coals are bright, jetty and non-laminated, and they contain a larger proportion of volatile matter than the coal of the peninsula fields; many of them are extremely friable and susceptible to disintegration under exposure; they do not cake as a rule and the proportion of ash is usually small.

DISTRIBUTION OF COAL

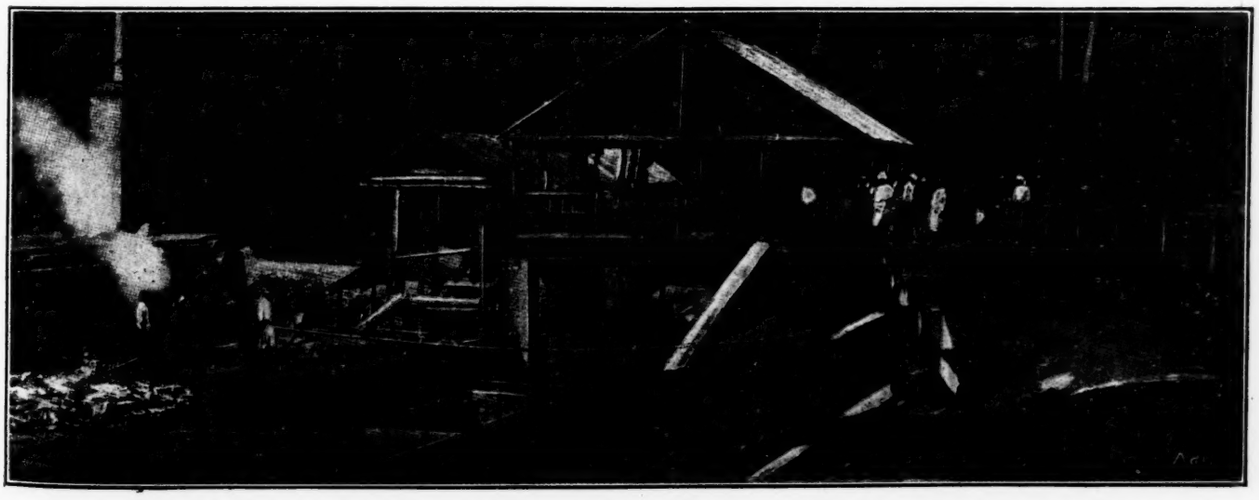
In 1873, T. W. H. Hughes made the following estimate of the extent of the known coal-bearing rocks in India:

Name of area	Square miles
Godavari and its affluents	11,000
Son	8,000
Sarguja or Gangpur	4,500
Assam	3,000
Narbada and its affluents	3,500
Damuda	2,000
Rajmahal	300
Unsurveyed and uncomputed	2,700
	35,000

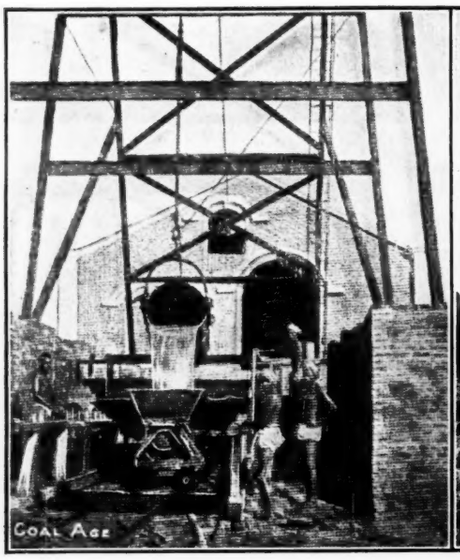
This estimate is probably somewhat in excess of the truth, but the additional evidence to date does not permit of a much closer approximation. Over a considerable portion of the area the coal-bearing rocks are covered by younger deposits and must lie at unworkable depths.

COAL TOO FAR FROM COASTS

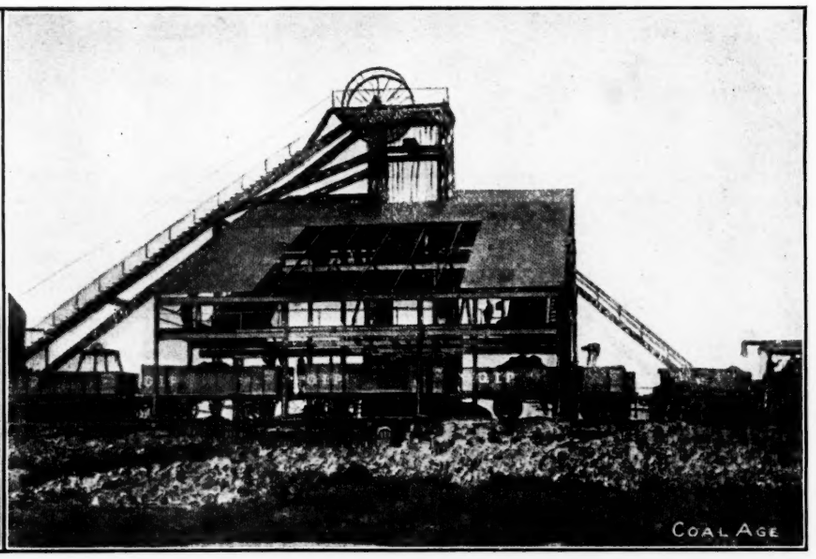
Although the coal-mining industry has now been in operation in India for more than a century, and although there has been a steady increase in production and consumption, which has been especially notable in the last decade, still it must be stated that the development of the coal resources of the country is as yet in an imperfect condition. Of the numerous coal fields of proved value in India, 18 are actually being worked, but only 7 are of any considerable importance, while 89 per cent. of the total output is produced in the Raniganj and Jharia fields. The reason for the relative importance of the various regions is easy to understand. Most of the coal fields are too remote from the ports and centers of manufacturing industry to render it possible for their product to be carried to places where it would have to compete with fuel from the best coal fields of Bengal, which fields,



LOADING WHARF, COAL WASHER AND COKE OVENS, NAMDANG, MAKUM, ASSAM



DRAWING WATER IN SINKING PIT AT JELGORA COLLIERY, JHARIA



HEAD GEAR AND SCREENING PLANT, BALLARPUR COLLIERY, CENTRAL PROVINCES, INDIA

from their strategic position, within easy reach of the coast, practically command the middle-eastern market. That a lively spirit of enterprise is abroad is, however, evident from the fact that coal-prospecting operations are in progress in nearly a dozen separate coal regions.

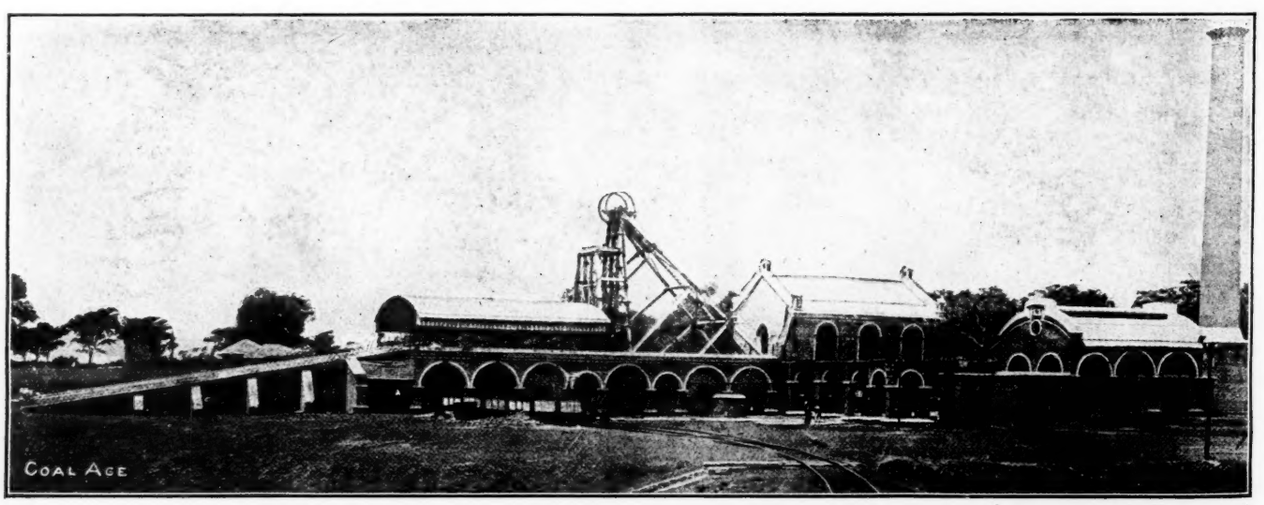
THE RANIGANJ COAL FIELD

The Raniganj field is the largest of the coal fields now being worked in India. It is situated from 120 to 140 miles northwest of Calcutta, and the East Indian Railway Co.'s line passes through it centrally. The Bengal-Nagpur Railway Co. also has access to the coal field, and besides these trunk lines there is a growing network of branch lines and sidings for the service of the collieries.

The extent of the exposed coal field is approximately 500 square miles, within which area the Panchet, Damuda and Talchir groups attain an aggregate thickness exceeding 11,000 ft. The general dip of the beds is toward the south at angles of from 5 deg. to 20 deg., and the measures are abruptly cut off at the southern boundary by a fault the throw of which must, at the least, be equal to the full thickness of the beds. On the east the coal measures dip under the Gangetic alluvium, and the boundary of the field is unknown. Recent borings, however, point to their extension eastward to a very great distance, but overlain by the higher beds of the series, and at a considerable depth.

There are numerous faults and dikes, most of which are obscured by the alluvial cap which covers so much of the coalfield, so that their presence is, as a rule, only disclosed during the course of mining operations.

The thickness of the coal at Jharia in measures Nos. 10 to 18, inclusive, aggregates 163 ft., seam 10 being 45 ft. thick and there being two other thick beds which are 23 and 26 ft. thick, respectively. A section taken between Katras and the Jamuni River totals 198 ft. of coal found in 19 seams numbered from No. 1 upward to No. 18, No. 16 being absent, and Nos. 8 and 15 being each in two benches. The thickest beds, Nos. 3 and 4, are not worked, but each measure is 20 ft. thick.



CHARANPUR COLLIERY, RANIGANJ COAL FIELD, BENGAL, INDIA

Handling Fine Dust at a Coal Washery

By J. Drummond Paton

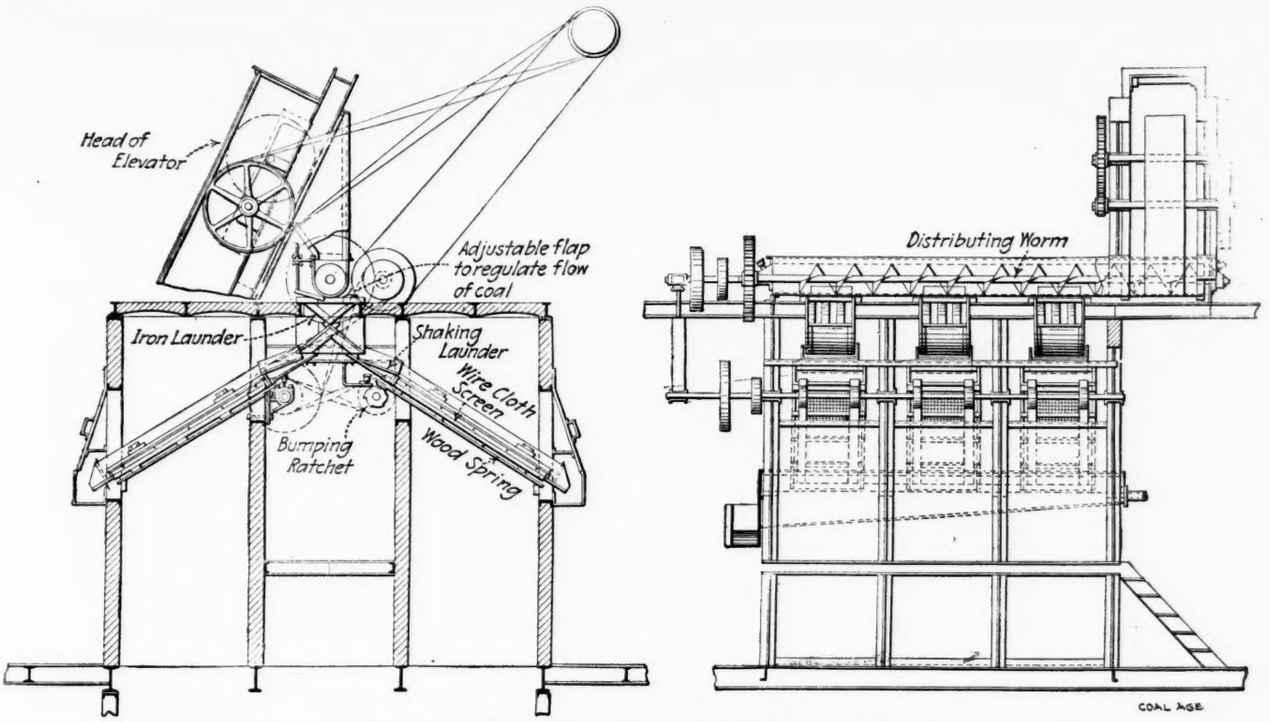
SYNOPSIS—The operation of washeries would be greatly improved if no sludge were formed, and by passing the finer coal, if naturally dry, over a fine wire-cloth screen adapted for the removal of the dust, this end could be attained. This dust is not markedly, if at all, cleaned in the washer, and, if clean, could be sold for many purposes, or, if dirty, could be used at the coal plant. It generally contains more impurities than any other size of coal.

The method of handling small coal and dust at the surface of the mine is the keynote to successful washing and to allow all the small coal under 1 mm. ($\frac{1}{25}$ in.) cube to pass into the washery is radically wrong. Where the moisture percentage is not over 5, the small dust which is as finely comminuted as that described may as well be removed by "percussive" screens as subjected to any other treatment. Trials and experiments prove that small coal from 0.5 mm. ($\frac{1}{50}$ in.) cube downwards cannot be cleaned in a washer. If the dust together with the coal in grains goes into the jig, the formation of sludge is unavoidable, making the operation of the washery difficult, as it is hard to dry the washed fine coal.

Owing to the sludge with which it is mixed, the mass is so dense that water can only slowly pass through it. Further, the fine sludge, on account of its larger surfaces, can take up an immense quantity of water.

Water Will Not Drain from Sludge

It is a proved fact that a piece of coal of 30 or 50 mm. ($1\frac{1}{4}$ to 2 in.) cube, if taken out of water, contains, after only a few minutes, $3\frac{1}{2}$ to $4\frac{1}{2}$ per cent. of moisture, whereas a quantity of sludge of a similar weight still contains 20 to 25 per cent. of water after several hours' draining. It is, however, most essential to have the fine coal as dry as possible for briquetting and coking purposes; especially is this the case if coal with only $17\frac{1}{2}$ to 18 per cent. of volatile matter is employed. A large number of mines which produce such coal do not succeed in obtaining coke from washed coal when the latter contains more than 11 per cent. of moisture, because the ovens are too slow in reaching the required temperature.



Humboldt-Weissmann Percussive Dust Screen

The screens are jolted 600 times a minute by a bumping cam and will screen out all dust under $\frac{1}{25}$ in. in diameter.

How the Coal Is Screened

The Humboldt-Weissmann percussion or bumping screens will extract coal dust below 1 mm. cube from a dust of larger size. The important features in the screens are (1) a continuous feed onto a large screen surface so that the wire cloth may not choke from overloading, and (2) a multiple cam at the upper end of the screen, which, as it revolves, drops the end of the screens resting on it 5 mm. ($\frac{1}{5}$ of an inch) 580 to 600 times a minute. This constant vibration of the screen prevents clogging unless the moisture content in the coal exceeds $4\frac{1}{2}$ per cent., when the wire-cloth openings must be increased to 1.2 or 1.4 mm. The screens give a large output with minimum power consumption at small initial cost and low maintenance charge.

*Abstract of paper on "Small Coal and Dust: Its Production, Prevention, Treatment and Utilization (Dry Mines)," presented at meeting, Apr. 13, of the Manchester Geological and Mining Society.

The power consumed by one battery of 18 shaking screens, amounts to only 1 hp., and only 4 hp. is required for driving the screw by which the coal is distributed over the screens.

Coal Dust Is Wetted but Not Washed in a Jig

By using these screens in connection with washers, the sludge is reduced to a minimum, the water can be used again and again without sludge tanks or funnel boxes, and there is no mass of wet coal to handle which will neither drain nor otherwise dry. The impossibility of cleaning the extremely fine dust which forms sludge in the washer is well known. Coal-washing bosses often say "The sludge is too dirty and must be removed from the washery."

Sludge tanks are therefore provided, and they are drained occasionally and the contents sold or used as boiler fuel at the mines. It can easily be proved that coal sludge contains about the same quantity of ash as crude coal of the same size, in some cases even a little more, since soft shale and clay are levigated and tend to disintegrate in water and mix with the finest part of the coal. If my assertions prove correct, the ash contents of a mixture of washed fine coal and dust cannot exceed that of washed fine coal mixed with the whole sludge.* But, unfortunately, the ash contents of the dirt sometimes debar the addition of the whole quantity to the washed coal, if the desired percentage of ash in the briquetting or coking coal is to be obtained, and so in many cases we cannot add all our dry dust to the washed coal and obtain a satisfactory coal product.

It is interesting to note how the quantity of the ash varied with the size of a certain Lancashire coal:

ASH IN A LANCASHIRE SMALL COAL

Size, In.	Weight of ash, per cent.
1¼ to ⅞	14.43
⅞ to ⅝	16.50
⅝ to ½	14.43
½ to ¼	11.34
¼ to 0	43.30

As an alternative, the fine coal ¼ in. to zero was further classified into the sizes: ¼ in. to 1 mm., of which there was 35 per cent., and dust 1 mm. to zero, forming 65 per cent. of the whole.

The following is the result obtained after washing the various sizes:

ASH IN A LANCASHIRE SMALL COAL AFTER WASHING

	Coal: 70.51 per cent†		Refuse: 29.49 per cent.	
Sizes, in.	Per cent. of size	Per cent. of ash	Per cent. of size	Per cent. of ash
1¼ to ⅞	11.75	4.52	1.65	70.00
⅞ to ⅝	13.61	3.45	2.47	60.00
⅝ to ½	11.75	5.37	1.86	75.00
½ to ¼	8.66	5.41	1.86	75.00
¼ to 0	23.92	11.18	9.48	68.00
Sludge	.....	.....	12.17	29.51

The slack divided into sizes between ¼ in. and 1 mm. and 1 mm. and zero yielded the following results:

ASH IN A LANCASHIRE SLACK AFTER SCREENING DUST AND WASHING GRAINS OF COAL

	Coal		Refuse	
Size	Per cent. of size	Per cent. of ash	Per cent. of size	Per cent. of ash
1¼ in. to 1 mm.	26.29	5.81	6.18	75
1 m.m. to 0 mm.	10.82	32.74	Unwashed	

*It is not by any means unlikely that the author of these remarks is justified in his conclusions, but his figures later quoted for the washed sludge of a Lancashire coal show 29.51 per cent. of ash and the same coal screened through a 1-m m. screen shows 32.74 per cent. ash. So in the case he quotes washing was not entirely ineffectual.

†An inexplicable error as the percentages of the various sizes total to 69.69 and not 70.51.

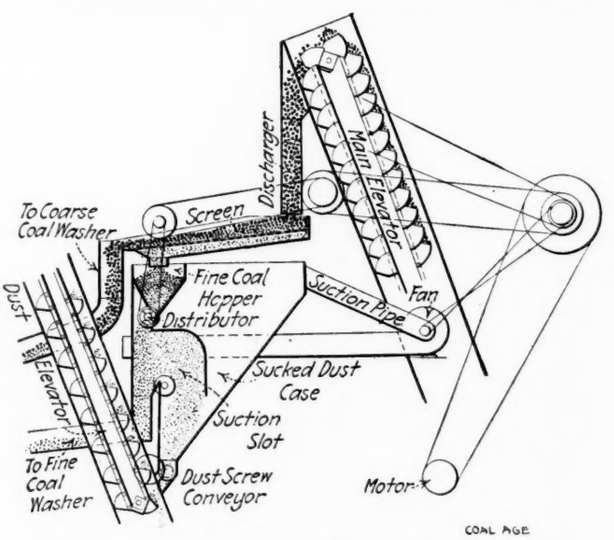
Screening versus Washing

The total final coal of ⅜ in. to zero averaged an ash content of about 10 per cent.; while the fine coal from ⅜ in. to 1 mm. only showed an ash content of about 5.7 per cent., so the great advantage in screening away the dry dust below 1 mm. diameter is confirmed.

If slack is to be sold without washing, and trouble is experienced in keeping the ash percentage within a fixed limit, then dry percussive screening is evidently the means to adopt for abstracting the most objectionable portion which contains the maximum ash. A customer can therefore be retained who might otherwise revert to a poorer quality of coal, where he would be compensated by the advantage of obtaining coal of larger average dimensions.

Dust for Coking

The question which now naturally arises is: What is to be done with this dust, when once it is removed?



Suction Method of Dust Extraction

A fan separates the fine dust from the slack by suction. This falls into a small hopper and is conveyed to a bin by an elevator.

The quality of this product must first be determined. The impalpable coal dust to which reference has just been made contained 32.74 per cent. of ash, but not all dust between 1 mm. and zero would be equally bad.

The following analysis of another sample shows what possibilities occasionally lie in that part of the coal which is called dust:

SAMPLE NO. 1

Products	Per cent.	Products	Per cent.
Coke yield	74.10	Moisture	0.60
Sulphur salts	1.30	Ash	16.80
Volatile matters	25.90	Coke yield (muck method)	74.80
Tar	3.20	Coke yield (distilling test)	74.10
Benzol	0.83		

SAMPLE NO. 2

Products	Per cent.	Products	Per cent.
Coke yield	75.10	Moisture	0.70
Sulphur salts	1.20	Ash	16.20
Volatile matters	24.90	Coke yield	75.00
Tar	2.90	Coke yield (distilling test)	75.10
Benzol	0.72		

It must be borne in mind, however, that samples 1 and 2 had not been over percussive screens, but nevertheless would be regarded as dust by the purchaser and cause him to condemn a shipment if too much of it were present in his slack.

It is impossible to install a coking plant for the sole purpose of disposing of the fine dust formed at a single mine, but it might be well for collieries to establish a plant to which this material might be sent and coked with a saving of byproducts, for development of power or for the manufacture of illuminating gas. The plant of Messrs. Koppers at Joliet, Ill., is making coke out of coal of which 85 per cent. passes through a 1/8-in. screen. If the coke would not prove of the best quality it could be sold for domestic purposes.

The price of such coal in the past has been by no means proportional to the calorific output it delivers when used with suitable stokers or dust-firing appliances under steam boilers.

Dust coal of 1 mm. diameter and under finds a ready market at foundries as a medium to produce blackening for the faces of molds or for reforming foundry sand. Various compounds for this purpose consist almost wholly of just such dust and sell at as much as $43.45 per ton. If the coal has a low ash percentage it can be used for many chemical purposes for which coal is now ground.

If collieries took up the utilization of their own dust for the distillation of oils, etc., the modern market would provide a consumer for the "coalite" coke which would be produced. The following table shows the temperature at which the various oils are distilled.

TEMPERATURES OF DISTILLATION

Temperature, Degs. Fahrenheit	Products
0 to 338	Water, ammonia-liquor, light oil, benzol, naphtha.
338 to 446	Medium oils, naphthalene, carbolic acid.
446 to 518	Heavy oils, creosote.
518 to 572	Anthracene, pitch.

Coking plants have cleared from $10,000 to $15,000 per month on byproducts alone, apart from coke sales, and this on a basis of 200 to 300 tons of coal carbonized per day. On an average, the returns available by coking approximate for each ton of coal carbonized as herewith:

AVERAGE RETURNS FROM COKING ONE SHORT TON OF COAL

Coke, in tons	0.6
Tar, in pounds	89.3
Ammonia salts, in pounds	26.8
Light oils and crude benzol, in U. S. gallons	27.
Available gas, in cubic feet	4500

Undeveloped Markets for Dust

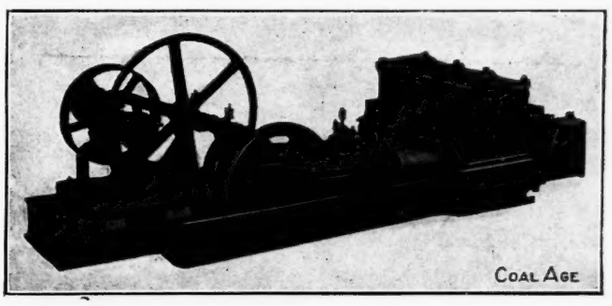
Had the money which has been spent in investigating the effects of coal dust and gas been applied to the collection of dust in the mines and elsewhere, the operators would have been compelled to find a market for it and would have educated the consumer to appreciate its value, but, of course, such dust would have to be collected with due regard to the necessity for keeping it free from extraneous substances.

A New Acid-Proof Mine Pump

Perhaps one of the most vexing problems which confronts the mine operator is successfully handling comparatively small quantities of highly acidulous mine water. The destructive action of this fluid upon pumps and pipe lines is well known. From time to time various expedients have been adopted to circumvent this evil.

About the most successful material which has been found for resisting the corrosive action of acidulous waters is wood. This material excels even the so called acid-resisting bronze, and under proper conditions will last longer and give more satisfactory service than lead.

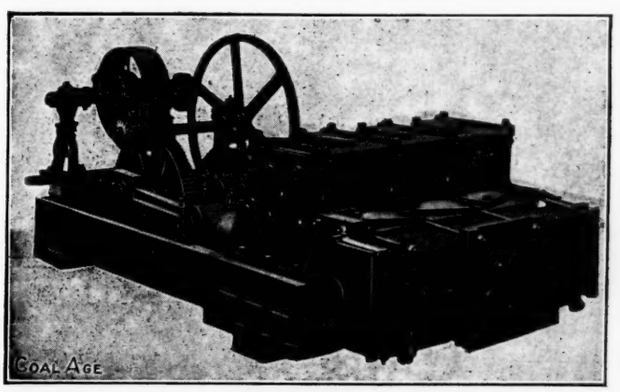
It will be readily understood that it is the parts of a pump which come into direct contact with the acidulous water which suffer most from corrosion. It is not uncommon for even brass- or bronze-lined cast-iron pumps to be destroyed by acid water in a comparatively short time. In some mines even a very few shifts are



Front View of Pump Arranged for Belt Drive

enough to practically destroy the working parts of the pump, particularly the valves, valve seats and valve springs.

With the foreging considerations in mind, George Robson, of Murray, Hocking County, Ohio, has invented and is about to place upon the market a type of mine pump wherein practically the only metal coming in contact with the mine water is the plunger. As may be clearly seen from the accompanying illustrations, this pump does not differ materially in principle of operation from the ordi-



Rear View of Pump, Showing Wooden Construction

nary, horizontal, triplex, outside-packed plunger variety. The cylinders, valve chests and valves are, however, all of wood.

In the construction of this pump, all wooden parts which are subject to pressure are thoroughly reinforced with castings upon the outside. The valves operate by gravity, and consequently no valve springs are necessary. In order to effectually prevent the valves from splitting, they are heavily banded around the edge with cast iron. This, however, does not come in contact with the valve seat, and consequently any pitting which may develop in the metal does not interfere with the efficiency of the pump.

This pump, built in a capacity of 250 gal. per min., to work against a 600-ft. head, has been in operation for 28 months in an Ohio coal mine, with an expense for repairs of 85 cents. This record is the more astonishing when we consider the fact that this machine took the place of two bronze-lined, cast-iron pumps, which failed after two weeks' operation.

Determination of Water in Coal

SYNOPSIS—The determination of water in coal has hitherto been a summation of the effects of four separate actions, though the outcome of only one was sought. Mr. Teed's method gives the actual water expelled at the temperature of desiccation.

In a paper at the meeting of the Institution of Mining and Metallurgy in London, England, P. Litherland Teed refers to the simple drying method universally employed for determining the percentage of moisture in a fuel, in which he says that sources of inaccuracy exist due to the following reactions:

(a) Oxidation of the pyrites making the result too low; (b) Oxidation of the coal itself making the result too high; (c) Volatilization of matter contained in the coal which also gives too high a result.

Mr. Teed claims to have devised a method for the determination of water in coal which gives a high degree of accuracy, is quick in operation and employable in many cases where simple drying would be impossible.

Moisture Absorbed by Lime

His apparatus consists of a 100-cc. pressure flask, a "U" tube of about ½-in. bore and a sulphuric-acid drying tube, all of which must be capable of withstanding atmospheric pressure; besides these, sound rubber corks and some form of vacuum pump are necessary. With regard to the latter, the Sprengel water vacuum pump worked by the main water-supply has been found to give a reduction in pressure equal to about 725 mm. (28.5 in.) of mercury and to be in every way satisfactory.

The illustration shows the apparatus used and needs no further explanation except to state that the right beaker is filled with boiling water, and the left with a boiling aqueous solution of common salt or calcium chloride.

The pressure on the coal is reduced and its temperature raised to that of the boiling water surrounding the flask in which it is contained. Thus the water content of the fuel, together with some volatile matter varying in quantity and character with the nature of the coal, distil off and pass into the lime tube. In accordance with the following equation

$$CaO + H_2O = Ca(OH)_2,$$

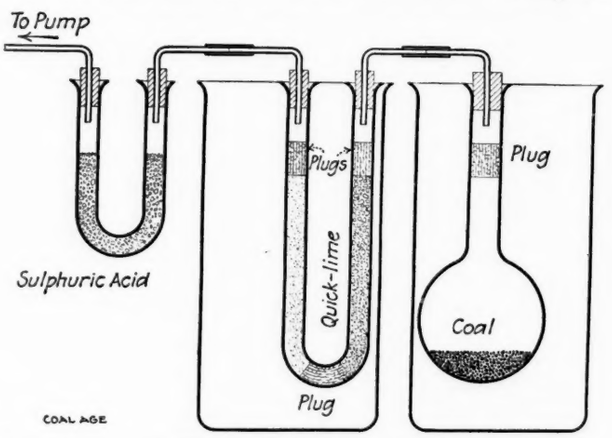
the water originally in the coal is chemically retained, while the other volatile matter because it has no chemical affinity for the lime, and because the temperature of the lime tube is too high for condensation, passes through to the sulphuric-acid drying tube, where some of it is retained, discoloring the sulphuric acid, while other portions pass through to the pump.

At the end of about half an hour, the whole of the water having passed from the coal to the lime tube, the tap adjoining the vacuum pump is turned off, the beaker of boiling water surrounding the coal flask is removed and the air gradually allowed to pass back through the sulphuric-acid drying tube to the vacuum beyond. Then the apparatus is dismantled, the lime tube washed externally, wiped, placed in a desiccator to cool, then weighed, and the increase in weight noted. As this increase is solely due to the water absorbed from the coal, the percentage of water in the fuel is easily calculated.

No Errors Due to Oxidation or Volatilization of Hydrocarbons and Sulphur

In the new method, the author claims that the two errors due to oxidation no longer exist because the water is distilled from the coal in the absence of air, and consequently no oxidation can occur. The volatilization of hydrocarbons and sulphur still takes place, but since the temperature of the quicklime tube is higher than the coal itself, no condensation can occur in this tube unless chemical action takes place.

Mr. Teed says one physical error undoubtedly exists, for the lime tube is attacked with loss in weight by the boiling solution of calcium chloride, and therefore for the most accurate work a correction must be applied, which is dependent on the strength of the calcium chloride solution and the time of immersion. Using the solution employed by the author it was found that the drying tube lost in weight 0.0030 gram per hour. The following table of results of three representative coals examined, shows that the results are independent of the time that the coal is under the influence of heat and reduction pressure.



Apparatus by Which the Moisture in Coal Can Be Accurately Determined

TABLE SHOWING THAT TIME DOES NOT AFFECT RESULTS

Nature of Coal	Weight of Coal Grams	Apparent Increase in Weight of CaO Tube Grams	Time Min.	Correction Grams	True Weight of Water Grams	Water Per cent.	
Anthracite	9.4305	0.2600	30	+0.0015	0.2615	2.77	2.78
	5.2244	0.1427	30	+0.0015	0.1442	2.77	
	3.1360	0.0860	30	+0.0015	0.0875	2.79	
Bituminous....	4.0800	0.2618	45	+0.0022	0.2640	6.46	6.45
	4.3442	0.2784	30	+0.0015	0.2799	6.44	
Lignite	10.4042	1.0588	60	+0.0030	1.0618	10.21	10.20
	3.7666	0.3832	30	+0.0015	0.3847	10.21	
	8.2526	0.8390	30	+0.0015	0.8405	10.19	

Dried Anthracite Has Large Powers of Occlusion

The author draws attention to a discovery he made in the course of his investigations in the following terms: When investigating the percentage of moisture in an anthracite, it was found that the increase in weight of the drying tube was greater than the loss in weight of the anthracite in the coal flask, by an amount far greater than would be accounted for by the fact that the aqueous vapor in the air originally in the apparatus would be absorbed by the drying tube. Naturally, it was at first

supposed that there must be some leak in the apparatus between the coal flask and the quicklime, but this, on performing a blank experiment, was not found to be the case.

The experiment was repeated, still using anthracite in the coal flask, and it was found that, while the increase in weight of the drying tube was equal to 2.78 per cent. of the anthracite employed, the decrease in the weight of the anthracite in the flask was equal to 2.52 per cent. So striking was this result, Mr. Teed adds, that this experiment was repeated ten times in all, when it was found that the mean increase in weight of the drying tube was equal to 2.78 per cent of the anthracite employed (these results did not differ by more than 0.04 per cent.), while the mean decrease in weight of the anthracite in the coal flask was equal to 2.54 per cent.; however, these results differed from one another by as much as 0.17 per cent., but no result was higher than 2.62 per cent.

In regard to this Mr. Teed can only conclude that when the water left the coal under the influence of the reduced pressure and heat, it left it in the physical condition of charcoal, capable, like that substance, of absorbing many times its own volume of gas.

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The Electric Mining Locomotive

By Geo. M. Kennedy

SYNOPSIS—A general description of the features common to practically all electric mining locomotives. The path of the current is traced through the machine from trolley wire to rail both when the motors are operating in series and in parallel.

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We are all familiar with the general appearance and work that is performed by the electric mine locomotive. This machine in its present stage of development embraces many different types and classes, but all of them regardless of make or size have many features in common.

General Construction of the Machine

The side frames are usually made of cast iron and the ends of either the same material or of cast steel. These members are securely bolted together in a thorough and substantial manner, and are designed and constructed for hard service.

Most electric locomotives are equipped with two motors, one suspended from each of the two axles. Movement along the track is obtained by means of pinions on the armature shaft meshing with gears mounted on the axle.

It should be remembered that the locomotive does not generate power in itself, but through its motors transforms electrical into mechanical energy, and thereby does useful work.

The purpose of the trolley wire is to conduct current to the locomotive from a source of supply. The rails upon which the machine operates also perform the function of carrying this current from the locomotive back to the origin of electrical energy. To do this efficiently they must be bonded at every joint and cross-bonded at certain intervals, say, every 200 to 400 feet.

If efficient service is to be obtained, it is important to have the trolley wire, rails and bonding in as good condition as possible. They must be free from leakage and poor joints, for either of these will cause an unnecessary drop in potential, that is, a loss in the driving force required by the locomotive, which results in decreased speed or failure to pull a normal load. In other words, every leak and every poor joint, whether it be in the track or the trolley wire or in fact anywhere in the circuit, disipates energy, which under good conditions would be utilized by the locomotive in performing useful work.

The locomotive is equipped with a trolley pole which, for various reasons, is made of wood. This supports the pole head, which in turn carries the harp, within which is mounted a deep-grooved wheel by means of an axle.

The Route of the Current through the Machine

This trolley wheel rotates along the trolley wire, making electrical connection therewith. It is here at the contact between wheel and wire that the current enters the locomotive. From the wheel it flows through the harp to the pole head, and from a terminal mounted thereon down a flexible-rubber insulated cable attached to the trolley pole to a movable cable contact block on the locomotive proper.

This contact block fits into and forms a connection with one of two stationary cable contact blocks. These are installed merely for the purpose of furnishing a convenient means of detaching the cable in case of any damage to the trolley pole or parts which are mounted thereon, for without these blocks or couplings loss of time would occur in case a trolley-pole equipment required changing, either due to breakage or some other cause.

Locomotives are usually equipped with two or more of the stationary cable blocks. This permits the pole to be placed in any one of two or more positions according to the number of blocks, or two separate trolley poles may be carried, one on either side of the locomotive. The contact blocks are connected together electrically by means of a suitable insulated cable and also to either a fuse block or to an automatic circuit-breaker, which is mounted on the locomotive close to the motorman's seat.

The fuse block is composed of some insulating material such as slate with suitable clips mounted thereon, into which is inserted a holder containing a fuse wire, which has a certain fixed current-carrying capacity depending upon the size or power of the machine.

The automatic circuit-breaker is a self-operating mechanism which opens the circuit when the current passing through the breaker exceeds a certain predetermined volume, at which the instrument is adjusted to operate.

Function of Fuse or Circuit-Breaker

The fuse, or automatic circuit-breaker, as the case may be, opens the circuit when an excessive current flows. Either of these devices is, therefore, exactly analogous to the safety valve on a steam boiler. From fuse block of circuit-breaker the incoming current flows through a

suitable conductor to the controller which governs the speed and direction of travel of the locomotive.

It consists of two drums which are sometimes called cylinders. The first, or main drum, is that by means of which the current is switched on or off, and the resistance, as will be explained later, is cut out step by step. The other is the reverse drum or cylinder. By a proper rotation of this drum by means of a handle provided for that purpose, the direction of flow of current in the motor armatures may be changed, which will in turn reverse the direction of travel of the locomotive.

This drum also connects the motors either in series or parallel as desired. This is accomplished by means of a group of stationary fingers and a group of contacts mounted on the cylinder, which as the latter is turned forms electrical contact with the fingers, making and controlling the circuit.

How Contact Blistering Is Reduced

When an electric connection is broken while current is flowing an arc is formed. In order to reduce to a minimum the blistering and burning of contacts and fingers, due to arcing, a blow-out coil is placed in the controller and is connected in series with the line. All the current used by the locomotive passes through this coil. The result is the existence of a magnetic region which has the effect of blowing out the arcing caused in shutting off the main controlling drum.

The resistance on a locomotive is for the purpose of obstructing or retarding the flow of current. It is made up of a series of cast-iron grids mounted in a suitable frame but insulated therefrom. This resistance reduces the electro-motive force or voltage to a point such as to permit the locomotive to accelerate moderately, which means that the motors will have a chance to speed up and not become damaged. This will be discussed later on.

Taps are taken from the stack of grids at different points to the controller. This permits the resistance to be cut out or reduced step by step until the full line voltage is impressed on the motors, either in series or parallel, depending on the position of the reverse drum.

The current after having passed from the controller to the resistance and back to the controller, now flows to the motors. If the reverse cylinder is set for the series connection, the current passes through one motor, back to the controller and then to the other motor and thence to the casing, axle, wheels and rails.

If, on the other hand, the reverse cylinder is set for the multiple or parallel connection, the current passes through both motors simultaneously, thence as before to the rail, or ground as it is often termed, due to the fact that the negative is of the same potential as the earth.

The controller in feeding the current should never be moved more than one point at a time, since when the motors are not in motion, the feeding of several points at once reduces the resistance to such an extent as to allow an excessive current to flow, causing the deterioration of the insulation and eventually burning out the field, armatures, etc.

Whenever possible, the serious position of the controller should be used in starting the locomotive from rest. Every time this is done with the controller in the multiple position there is an excess of current flowing at the start, or until the locomotive is accelerated. In shutting off the controller it should always be moved to the off position and never held on any intermediate point.

When the Circuit Is Interrupted, Seek the Cause

When a fuse burns out or the automatic circuit breaker is thrown, there is some reason for it and before replacing the fuse or closing the breaker, search should be made to ascertain the cause. Perhaps the trip is too heavy, or an armature has a ground, or a field is short-circuited. A thorough investigation may save the locomotive from more serious damage. Sometimes copper wire is substituted for fuse wire. This should not be allowed under any consideration.

The locomotive should be examined regularly. A general inspection should be made twice each week, when the electrical connections may be examined to make sure that all parts are tight. Frequently controller contacts may be unduly burned, due to the fingers requiring a little more tension.

The air gap is the space between the armature and the field poles. As the shaft bearings wear down, this air gap becomes less, and if not attended to sooner or later the armature will rub on the pole faces, which results in the destruction of its winding and possibly that of the entire motor. The armature cap bolts sometimes work loose with the same results.

The motor bolts rarely work loose if a proper lock washer is provided, but there is a tendency to use this part over and over again. When the tension of the washer is gone, it is virtually flat, and if used in this condition will invariably result in damage to the equipment.

At the begining of each shift the trolley pole equipment should be lubricated. A drop of oil in the hole on the trolley wheel for that purpose reduces the wear on the bushing considerably. The grease cups, both armature and axle, should have a few drops of oil at the same time. A hole can be made to the axle through the grease in these cups by means of a screw driver. A little oil should then be poured into this hole and the grease pressed down again or the cup refilled. This procedure will save considerable wear on the bearings and a great deal of labor and expense. This is a fairly satisfactory method of securing proper lubrication of these parts.

BY THE WAY

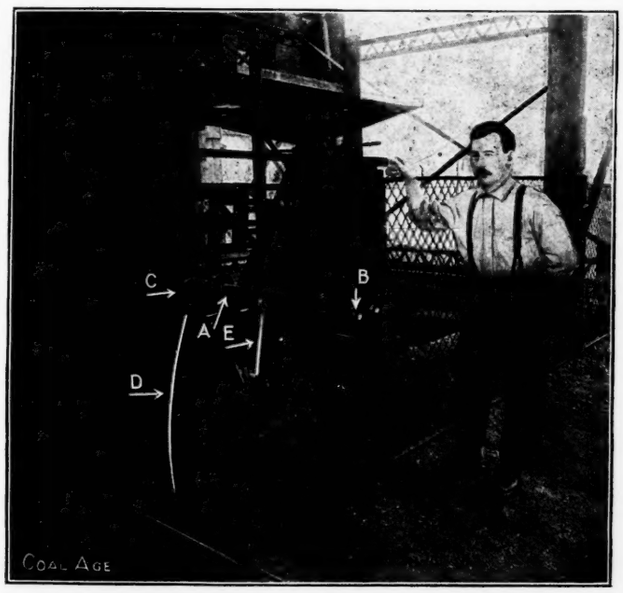
F. N. Cameron, general manager of the Castle Valley Coal Co., the Consolidated Fuel Co., the Castle Gate Coal Co. and the Black Hawk Coal Co., all in Utah, has just gotten out a little booklet for free distribution, suggesting and advocating a campaign of "safety first" on the part of all the employees of his companies. As a basis for the printed matter in the booklet, Mr. Cameron has taken a poem on "Safety First," recently published in Coal Age. This interesting little pamphlet has been printed in three languages, and there is no doubt but that considerable good will result from this unique campaign for greater safety in mining.

Thomas Badger (South Yorkshire coroner), addressing the jury summoned to inquire into the cause of deaths of persons killed in the Warren Vale explosion, in 1852, suggested the desirability of establishing a school of mines to teach elementary chemistry and physics to miners and their boys. Fifteen years later the Department of Science and Art, connected with the South Kensington Museum, commenced to send out teachers to coal mining and manufacturing centers; for the purpose of giving technical instruction. One of the best known and most highly successful of these teachers was Mr. Buckmaster, whose district covered the Midland coal field of England. Many readers will remember Mr. Buckmaster.

Safety Lock for Shaft Gates

The accompanying engraving and plans illustrate a safety gate fastener for mine and elevator shafts. Such a device had become imperative because of numerous fatal accidents occurring through persons walking into an open shaft under the impression that the cage was at the landing. This device makes it impossible for the safety gates to open except when the cage is in that position.

The illustration shows the device in position at the surface of the No. 1 mine of the Jenner-Quemahoning Coal Co., at Jerome, Penn. It consists of a shaft *A* supported by two angle irons having circular openings at the top in which the shaft revolves. At the outer end of the shaft is attached a crank *B*. At the inner



THE SAFETY DEVICE IN POSITION AT SHAFT ENTRANCE

end is fastened a circular metal disk *C*. On the circumference of this disk is cut a notch. *D* is an arc-shaped spring 14 ft. long, fastened at its lower end to the shaft timbers below the landing, with the curved portion extending into the shaft compartment.

The object in having the spring arc-shaped is to allow the side of the cage traveling in either direction to strike it at nearly a tangent. At its upper end the spring is bent horizontally to allow it to pass under the disk *C*, the extremity being turned up in a vertical position, to engage the notch in the disk in the manner of a "dog" or pawl on a ratchet, thus preventing movement of the disk either to right or left. *E* is a lever fastened to the shaft *A*, which enables a person standing on the cage to operate the gate lock.

The plan of operation is as follows: When the cage is either above or below the landing, the crank *B* extends horizontally across the movable end of the gate, keeping it closed. The vertical end of the spring prevents the shaft from being revolved by locking the disk *C* in position.

As the cage approaches the landing either ascending or descending the side of the platform strikes the spring *D*, forcing it outward. This removes the dog from contact with the disk, permitting the shaft to be revolved and the gate to be opened.

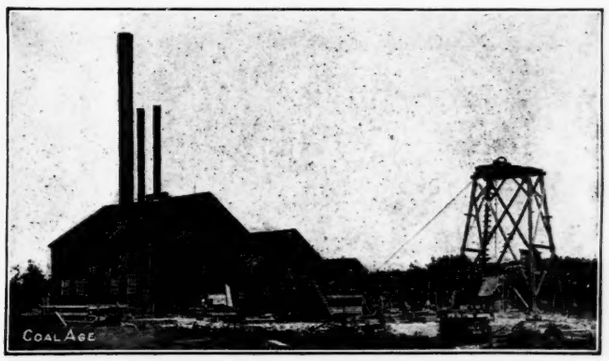
The commendable features of this device are its simplicity of construction and operation and the effectiveness of its action, it being absolutely impossible to open the gate (except by breaking the mechanism) unless the cage is in position at the landing. The inventor, Mr. D. G. Alsop, of Jerome, Penn., who has patented the device, has also perfected an automatic gate closer as an attachment to the above.

A Large Concrete-Lined Shaft

A new shaft was recently sunk to bed rock at St. Albert, Alberta, eight miles northwest of the business district of Edmonton. This shaft is 29 ft. in diameter, with thick walls of reinforced concrete. It will be used in reaching a bed of coal 8 ft. thick.

The sinking of this shaft was no small task. The earth was dug by a clamshell dredge. When the hole was a few feet in depth, a ring of concrete was poured and permitted to sink. As the dredge dug the excavation deeper, more rings were poured, the construction being continued day by day until the bottom edge struck bed rock. This concrete casing was then cemented and sealed to keep water out of the shaft.

It has been announced that this mine will be equipped with modern machinery, and as soon as the hoisting ap-



BOILER AND ENGINE HOUSE AND TEMPORARY HEADFRAME

paratus is installed the work of drifting through the coal will be begun. The ultimate daily output is placed at 2000 tons. The shaft below the concrete lining is sunk through the rock, the top of the coal vein being 337 ft. below the surface of the ground.

The company financing this enterprise is a French syndicate of capitalists. It owns in fee a large area of land about a mile from the municipality of St. Albert, and also has extensive leases. The present equipment of machinery and buildings will be enlarged when the mine is putting out its full capacity, and 500 men will be employed as soon as development work is completed.

This coal field was located in 1910, and development work was started a year or so later. The shaft was begun in 1912, the sinking occupying about 10 months. It is expected that work at this mine will be sufficiently advanced so that shipments will begin in a short time.

The builders of this shaft affirm that it is the largest and deepest of its kind in the world. The owners have invested in the neighborhood of $1,000,000 in the enterprise, which is expected to pay handsome dividends from the start of operation. The stock is held by a small group of people, and not a share is on the market.

German Timbering Methods

From a report on mining practice in Prussia during the year 1912, contained in the "Zeitschrift für das Berg-Hütten- und Salinenwesen," Vol. 61, No. 1, the following notes are derived:

At the King Ludwig mine in the East Recklinghausen district, iron* timbering is extensively used. In some parts, especially when the coal contains much gas, the posts and cross-pieces of "timbering sets" are curved so that each is about 3.2 in. out of a straight line at the middle; see Fig. 1. This method has proved satisfactory. The members being fixed firmly at their ends by the incrushing action of the roof and sides serve to convert bending stresses into thrusts, which the material is better fitted to resist.

FIG. 1. CURVED "TIMBER SETS" IN GERMAN MINES

At the Recklinghausen I mine in the Herne district, iron and timber sets are cushioned against roof and side pressures by inserting at the joints of post and crosspiece, wooden blocks which, by their elasticity are said to increase the durability of these to a considerable degree (see Fig. 2).

In the Lietstolln region of the Obernkirchen general mining department, South Hanover district, it has been the practice to point the props in order that on subsidence of the roof they may penetrate the soft shale of the floor. In many parts of the workings, however, hard

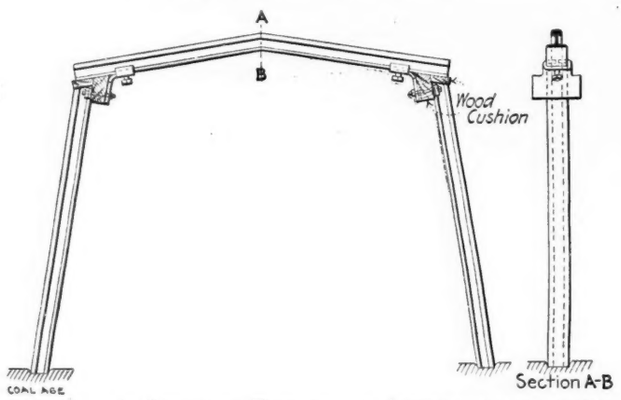


FIG. 2. A CERTAIN DEGREE OF ACCOMMODATION TO ROCK MOVEMENT IS PROVIDED BY WOOD CUSHIONS

concretionary bodies in the clay oppose the entry of the props, so that they and the cross-pieces break under the roof pressure. Experiments have, therefore, been made with the yielding posts made by Hermann Schwarz, in Kray, Rhineland.

A POST WITH A CERTAIN DEGREE OF "GIVE"

Inside of the channel-iron side post of a "timbering set" a T-iron is caused to slide. This sliding member is shaped like a wedge at the bottom and conformed at the top so as to support the cross-piece. When the T-iron has been slidden up in the post so as to protrude above it as high as is required, it is clamped there by means of a strap and wedge. This rectangular strap, which surrounds the post, has an eccentrically arranged screw bolt, which bears against the back of the U-frame opposite the T-iron, so that the strap does not press against the post directly. A wooden wedge is then driven between the strap and the wedge bottom of the T-iron, so as to clamp it.

Under pressure of the roof the wedges gradually slide together and allow the T-iron to settle. When the roof above the entry has subsided to the packing and no further retraction of the T-iron is observed, the composite iron post is removed elsewhere, being replaced by a weak prop of about 5.2 in. diameter and 6 ft. long. The iron posts are removed by a quarter turning of the bolt, thus loosening the wooden wedge and T-iron in the frame till the headpiece can sink. The experiments with these posts are not yet concluded.

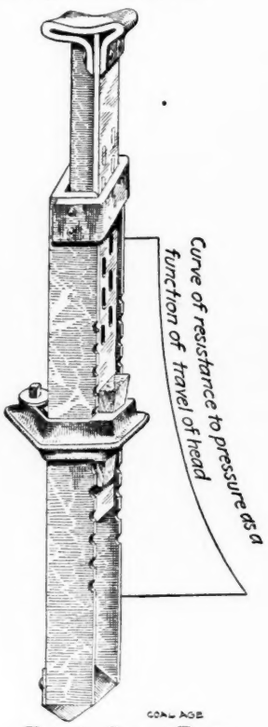


FIG. 3. STEEL ROOF SUPPORT

[This post is illustrated in the accompanying drawing. The curve on the right shows the resistance to compression by horizontal ordinates. It will be seen that the post resists almost four times as large a pressure when at its shortest length as it will resist unyieldingly when fully extended. By changing the wood wedge for one less compressible, the resistance of the post to compression may be increased at will and the adjustment of the position of the wood wedge relative to that of the moving part of the post provides a similar choice in compressive resistance.

These posts are also made by R. Centner Fils, of Verviers, Belgium, and the makers assert that several thousand of them are in actual service and that they save about 6c. per ton, in the cost of the coal at ruling prices of wood posts in Europe.—ED.]

A New Type of Colliery Fan

Although in a good many departments, colliery practice appears to have become standardized, improvements of a radical description frequently arise which open up new possibilities to the colliery engineer. An instance of this kind is to be found in a new type of fan which has recently been introduced in South Wales and which possesses some very distinctive features. This fan, which is produced by the Turbon Patent Fan Co., Ltd., of Llanelly, is here illustrated with the casing removed.

It will be seen that the runner is of peculiar design. In general outline it resembles the usual drum-shaped, multi-blade type, but instead of being made up of a large number of narrow blades of great axial length secured by rivets, the new runner consists of rings pressed into a

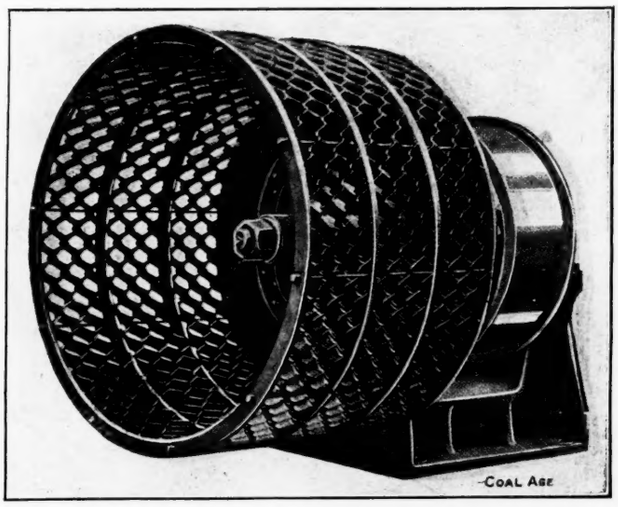
*The word "iron" may be used here in a broad sense to cover steel.

corrugated shape, and made to interlock with each other in such a way that no rivets are required.

The corrugated rings are secured between the driving disk and a holding ring by means of stay-bolts binding the whole construction firmly together. In this way it is impossible for any ring to move out of place, because at every corrugation it is locked into the adjoining rings, and since all the rings are pressed from the same dies, they are perfect duplicates. Hence the runner is self-centering and self-balancing. The importance of this property in connection with the high fan speeds which are employed in connection with fans direct connected to electric motors cannot be overestimated.

It will be seen that this method of construction gives exceptional torsional strength to the fan. The rings are much better fitted to withstand the driving strain transmitted to them than the usual type of blade which is secured by a short lip bent at right angles and riveted to the disk.

The runner can be easily taken apart by unscrewing the nuts from the stay-bolts and drawing off the rings.



NEW FAN WITH CASING REMOVED

Hence in case of accidental damage it is an easy matter to replace one or more of the rings. Another important feature is that the rings can be reversed so that the runner is suitable for revolving in the opposite direction and when required the casings can also be made reversible, so that the same fan is suitable for conditions which require either clockwise or counter-clockwise rotation. The casing is, of course, of the spiral type and does not differ materially from that of the ordinary inclosed fan.

Another important point is that the form and construction of the blade rings makes the runner especially suitable for use with high temperatures. The blades being formed of a series of curves, makes them sufficiently elastic to allow of expansion in all directions without the slightest strain on any part of the runner. Hence the fans are useful for a large number of factory processes such as the production of induced draft for boilers. Under these circumstances they can be worked at temperatures up to a dull-red heat.

As regards silence, in operation, it must be remembered that the ordinary fan has a sort of paddle-wheel action, the blades passing the outlet in a series of beats tending to cause vibration and noise. With the new runner, the movement of the blade rings past the outlet is a continuous one, the pulsations being smoothed out, resulting in a continuous output of air. The turbine-like construction assumed by the blade rings when assembled, gives an exceptionally high yield in volume and pressure, while the hold obtained on the air is more effective than in the series of oblong passages.

The capacity compared with overall dimensions is extremely high, and efficiency is maintained over a wide range of conditions. The fan has a high manometric capacity, maintaining high pressures at low blade-tip speeds. On the other hand, owing to the fact that holding rings can be placed between the blade rings in high-speed fans, any required strength to resist centrifugal stress can be easily obtained and hence the fan is well adapted for running at excessive velocities.

The particular runner shown in the illustration, having two inlet holding rings, is designed for water gages of 6 in. and over. Hence the claim can be made that these fans are useful for either high, low or intermediate pressures. Owing to its great adaptability to varying conditions, its strength and simplicity of construction, this new type of fan appears to offer great possibilities, and it will be interesting to watch in further practice how these are realized.

Explosion in a Welsh Colliery

SPECIAL CORRESPONDENCE

One of the worst mine disasters in British history occurred Oct. 4 in the Universal Colliery at Senghenydd, Glamorganshire. The day shift comprised 935 men. Of this number 489 have been rescued alive, and 12 miners were brought out dead. This leaves 434 men still entombed in the workings.

The explosion occurred about two hours after the men had descended into the mine. The force of the explosion demolished the headframe at the shaft and shook the entire town.

Rescue work was started immediately, and it was due to this prompt help that so many men were brought to the surface uninjured.

Owing to the tremendous falls of roof and the effects of afterdamp and flame, rescue work was abandoned temporarily, and all attention was turned to an effort to control the fire that had resulted from the first explosion. All the men remaining in the mine cannot be reached until the fire has been overcome.

The Universal mine is known as a gaseous colliery and it is stated that on the day before the explosion occurred (Monday) certain portions of the mine were so gassy that they were closed off and no one was permitted to work in these dangerous sections. An explosion in this same mine in 1901 caused the loss of 81 lives.

The violence of the present explosion is clearly indicated by the fact that one man who was working on the surface, 20 yd. from the pithead, was decapitated by the force of the blast. The rescue party was composed of miners belonging to the night shift. They entered the mine by way of an adjacent shaft, and in this way saved the 489 men who were found huddled together in those parts of the workings where the ventilation was still good. The 12 men who were brought up dead had been killed by being dashed against the sides of the entry.

Convention of American Mining Congress

The First National Mining Exposition to be given in Philadelphia, Oct. 17 to 25, under the auspices of the American Mining Congress, has gone far beyond the expectation of its promoters, and promises to be a trade gathering of much importance.

The American Mining Congress, which is to hold its convention at the same time, will bring to Philadelphia a large number of the leading mining men of the country, and these will attend the exposition in addition to those who will come solely for the exhibit. Considering the short time that the exposition has been under way, it promises to be a most interesting show.

A number of the exhibitors and their exhibits are as follows:

Westinghouse Electric & Manufacturing Co., Pittsburgh, and Baldwin Locomotive Co., Philadelphia, mine locomotives; Western Electric Co., New York, mine telephones; Milwaukee Locomotive Co., Milwaukee, Wis., gasoline mine locomotive; Universal Portland Cement Co., Chicago, Ill., use of cement in mining; Streeter-Amet Weighing & Recording Co., Chicago, automatic weight recorder for mine tipple scales; the Lobdell Wheel Car Co., Wilmington, Del., car wheels and axles as applied to mining cars; J. S. McChesney & Co., Chicago, mine supplies; Williams Patent Crusher & Pulverizer Co., Chicago, a coal crusher; Atlantic Refining Co., Philadelphia, lubricating oils; Hirsch Electric Mine Lamp Co., Philadelphia, miner's cap and lamp; Henry Troemner, Philadelphia, assay and analytical balances; West Virginia Rail Co., Huntington, W. Va., steel rails; Keuffel & Esser Co., Hoboken, N. J., mathematical and surveying instruments; C. O. Bartlett & Snow Co., Cleveland, Ohio, working model of a complete coal-handling plant; American Tempering Co., Springfield, Ill., a system of welding; Hyatt Roller Bearing Co., Newark, N. J., mine-car wheels with roller bearings; Roessler & Hasslacher Chemical Co., New York, the sodium compounds used in mining; Link-Belt Co., Chicago, elevating, conveying and transmission machinery; Fairmont Mining Machinery Co., Fairmont, W. Va., portable electric mine pumps, etc.; Draeger Oxygen Apparatus Co., Pittsburgh, Penn., life-saving apparatus; General Electric Co., Schenectady, N. Y., electric machinery and appliances; Jeffrey Manufacturing Co., Columbus, Ohio, storage-battery locomotive, etc.; John A. Roebling's Sons Co., Trenton, N. J., wire ropes and cables; the Alexander Millburn Co., Baltimore, Md., carbide lamps, etc.; Main Belting Co., Philadelphia, belting; Electric Storage Battery Co., Philadelphia, storage batteries designed for mine locomotives; Goodman Manufacturing Co., coal-mining machinery; John G. Scott, Girardsville, Penn., patented transmission rope clip; Edison Storage Battery Co., Orange, N. J., storage batteries and electric mine lamps.

In addition to the above, there are twenty or more representative mining concerns that are just closing up negotiations for space in the exposition.

Bells or Kettles

By H. D. Easton*

Nearly all coal miners are more or less familiar with the so called *bells* or *kettles* that so often occur in the roof above the coal. These bells are the fossil remains of tree stumps, and being larger at the bottom than at the top, they slip out of their sockets in the roof in a deadly manner; upon being sounded they may appear to be perfectly solid and safe, yet they will fall suddenly without giving the slightest warning to the men working beneath or near them. These bells are invariably coated with a thin skin or layer of coal which permits them to fall out of the roof, the origin of this thin coating of coal always being a source of wonder to the miner.

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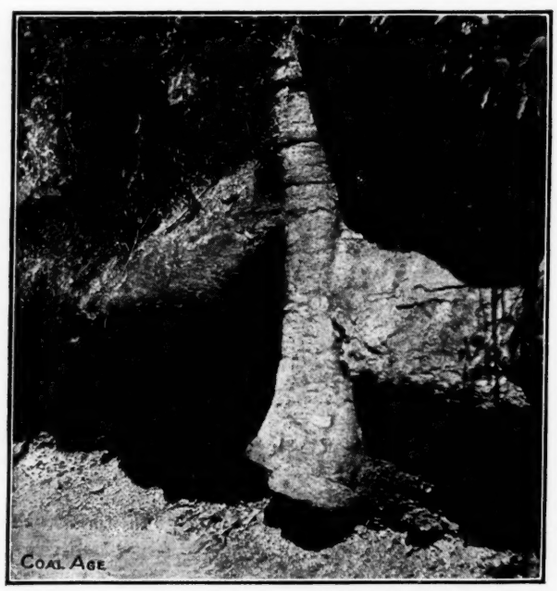
The Fossil Tree at Harlan

The accompanying photograph furnishes the best illustration of one of these fossil stumps that I have ever seen. This bell is in a soft shale beneath the Hazard coal on the bank of Greasy Fork, in Harlan County, Kentucky, and is on the property of the Pine Mountain Settlement School. It measures 26 in. in diameter at the base, 10 in. at the top and is 8 ft. in height. It carries the thin covering of coal wherever it is in contact with the shale, but the exposed surface has nearly all of the skin of coal removed.

These trees have their modern representatives in our common horsetails. The *Lepidodendra* trunks rose fully 50 ft. in the air, and the genus *Sigillaria* grew equally tall. The roots of these trees are among the fossils most generally found in the coal fields; the pitted and tubercular roots, so often uncovered are known as *Stigmaria*.

How the Coal Skin Forms around Bells

The theory regarding the formation of these bells with their thin skin of coal is well illustrated by the conditions now existing at Reelfoot Lake, in northwestern Tennessee, where, in 1911, an earthquake caused a subsidence which destroyed many large trees. It is reported that the trunks of the trees in this lake are wholly decayed except the outer ring of sapwood. It is readily seen that the core of such a stump could become filled with clay or sand which, under proper conditions, would change into rock, while the sapwood, still remaining, could form a skin of coal covering the core. In some cases these hollow stumps might not be filled until the sediment outside reached their tops, and the core, thus made subsequent to the deposition of the surrounding material, would then be composed of a material corresponding more closely with the strata at the top of the stumps rather than with that immediately surrounding them. It is usually true that these fossil trees are of a different composition from that of the strata in which they are found.



A Fossil Tree Trunk in Harlan County, Ky.

POWER DEPARTMENT

A Big Electrically Driven Air Compressor

SPECIAL CORRESPONDENCE

SYNOPSIS—Although many mines have made installations for electric generation, transmission and utilization of power, some have, for various reasons, seen fit to use compressed air at the working face. This article describes a large electrically driven air compressor in use in South Wales.

Since the introduction of electricity into colliery operations, there has been a certain amount of rivalry between the new means of power production and transmission and older forms, such as compressed air. Each method has its advantages. Electricity, of course, is capable of transmission with the minimum amount of loss, the cables are flexible and can be led anywhere, and when due provision is taken as regards good installation and maintenance, its safety is fully equal to all colliery requirements.

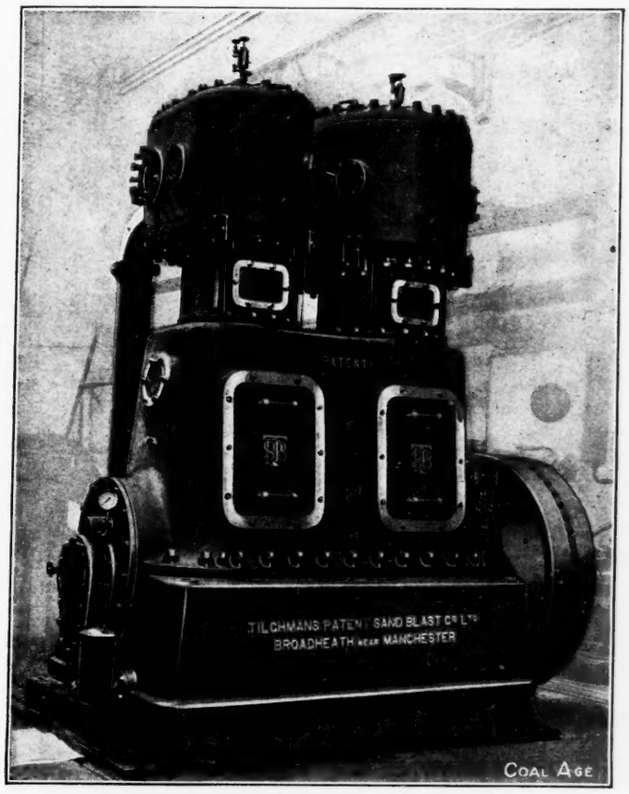
On the other hand, compressed air is much in favor, especially for drills, coal cutters and similar portable equipment. The exhaust provides a quantity of pure, fresh air at a low temperature, which greatly assists the conditions of operation at the working face. The chief disadvantage with regard to compressed air is the high cost of an efficient system of transmission and the inevitable loss of power which occurs due to leakage and temperature changes.

As colliery workings become more extended, electricity comes more and more into use. Obviously in those plants where a small central station is installed to operate the power-consuming appliances throughout the mine, the question arises as to whether it is not advisable to combine the advantages of the two systems, by installing electrically driven air compressors which can be operated at high efficiency, the compressed air thus obtained being then utilized in standard power-consuming appliances.

In a good many instances, this course has been adopted and attention may therefore be drawn to what is probably one of the largest installations of electrically driven air compressors for mine purposes which is at present in existence. This is to be found in the mines of the Great Western Colliery Co., Ltd., of Pontypridd, South Wales, and consists of two compressors of the type shown in the illustration. Each of these machines has a capacity of 2000 cu.ft. of free air per min., when running at a speed of 290 r.p.m. The diameter of the low-pressure piston is 28 in., while that of the high-pressure piston is 17 in., the length of the stroke being 12 in. They are suitable for a working pressure of 100 lb. per sq.in., and are each driven by an electric motor of 400 hp. One of these sets is installed at Llantwit Vardre, and the other one at Maritime colliery, Pontypridd.

The machines are of the vertical, high-speed, two-stage, double-acting type, inclosed and thoroughly water-jacketed. They were constructed by Tilghman's Patent Sand Blast Co., Ltd., of Manchester. The air cylinders are fitted with valve chambers, arranged at the back, these being water-jacketed together with the cylinder heads. The pistons are of the box-pattern type, fitted with cast-iron packing rings.

The cylinders are fitted with automatic multiple-plate valves. In the valve chest an independent inlet and outlet valve is arranged at each end of the cylinder and the common trouble of carbonized oil on the valves due to the heating of the air during compression, is prevented



THE AIR COMPRESSOR ON BUILDER'S TESTING-FLOOR

by the thorough water-jacketing previously mentioned. Each valve consists of six plain, thin steel plates or rings working on a removable cast-iron seat, a suitable guard plate being provided to control the lift of the valve.

The two plates next to the valve seat are made perfectly flat and the remaining four are slightly buckled, forming a simple and reliable spring, which, owing to its length, is not liable to break. The number of plates and the degree of buckling is arranged to suit the air pressure and speed at which this type of compressor operates. Each valve and spring, together with its seating and guard, can be removed as a whole for inspection. The four seatings are held in position by one through bolt, rendering the removal of any of the valves a simple and easy matter.

On the inlet or discharge sides of the machine, an automatic unloader is provided, which throws off the load when the air pressure in the receiver exceeds that required and allows the compressor to run light until the pressure drops to normal. The discharge unloader is provided with a back pressure valve, allowing the compressor to be started up from rest against no-load with the full working pressure in the receiver.

Pressure Lubrication Is Employed

Lubrication of the bearings and slides is effected by oil under pressure, while the cylinders are lubricated through a forced sight-feed lubricator on the front of the center box. The intercooler is of cast iron and is placed in a vertical position at the back of the machine, the cooling tubes being of brass secured in position in packed glands in the tube plates in the same manner as with ordinary steam condenser tubes.

The photograph shown was taken in the shops of the manufacturers before shipment to the colliery, but since installation, it has been found that these compressors run in a satisfactory manner, thoroughly fulfilling the purpose for which they were installed.

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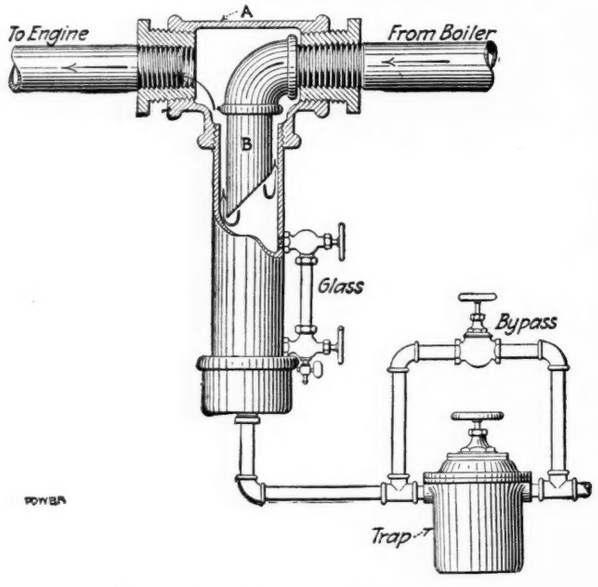
An Improvised Steam Separator

The illustration clearly shows the construction of a steam separator made of pipe fittings, says Martin McGeery, in *Power* of Oct. 7, 1913. The size of the fittings used will, of course, vary with the size of line on which the separator is to be placed.

The tee *A* should be much larger than the steam line to allow sufficient steam to get through the separator.



Construction of the Separator

By cutting the nipple or short length of pipe *B* on an angle, as shown, turning the long side toward the direction of flow, I believe more water can be taken from the steam than if the nipple is cut straight across.

A gage-glass is fitted to the drop leg and a steam trap is placed in the line draining this leg. This type of separator can be easily and quickly made and gives fairly good results.

Home-Made Emery Wheel for Grinding Valves

I have heard and read of many ways of grinding valve seats, says E. E. Thompson, in *Power* for Oct. 7, 1913, but never heard of a method like my own: Remove the disk holder from the valve stem and cut out the composition disk and fill up with emery with just enough thin glue to make the emery damp. Smooth off the top and set away for a few hours; when the mixture hardens it makes a good emery wheel of the proper size. Place it in the valve and turn with a brace. If it is desired to use the disk holder in the valve, submerge it in warm water for a few minutes and scrape out the softened emery.

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Recent Legal Decisions

Nondelegable Duty of Coal Operators Toward Miners in Washington—The duty of coal operators under the laws of Washington to provide sufficient ventilation in their mines for the safety of employees is absolute in the sense that the operator is liable for failure of one to whom the duty has been delegated to perform it. **(Washington Supreme Court, Davies vs. Rose-Marshall Coal Co., 134 Pacific Reporter, 180.)**

Rights of Purchasers of Corporate Stock—One who buys shares of stock, without notice of any claim existing in favor of the corporation against the person from whom he purchased, is entitled to compel the company to register the transfer on its books, or to recover damages resulting from its refusal to do so, and, hence, cannot recover against the seller on the theory of a breach of warranty as to his title. **(Arkansas Supreme Court, Bankers' Trust Co. of St. Louis vs. McCloy, 159 Southwestern Reporter, 305.)**

Actionable to Induce Breach of Contract—It is an actionable wrong to induce another to break a contract with a third person. **(Maryland Court of Appeals, Cumberland Glass Mfg. Co. vs. DeWitt, 87 Atlantic Reporter, 927.)**

Scope of New York Coal Sales Law—The law enacted in New York in 1911, making it a misdemeanor to deliver coal sold, without delivering a scale ticket to the buyer, applies to sales to retail dealers, as well as to ultimate consumers by dealers. **(Onondaga County, New York, County Court; People vs. Delaware, Lackawanna & Western Ry. Co., 143 New York Supplement, 159.)**

Duty to Keep Mine Roofs Safe—Kansas coal operators are bound to use a reasonable degree of care to keep the roofs of their mines in a reasonably safe condition for miners who are required to work under them. **(Kansas Supreme Court, Reynolds vs. New Century Mining Co., 133 Pacific Reporter 844.)**

Liability for Injury to Minors—A West Virginia coal mining company is liable for injury to a boy miner put to work by the company's mine boss, without being instructed against dangers not appreciated by him. But a boy more than 14 years old is presumed to know the ordinary dangers of his employment, though this presumption may be rebutted. **(West Virginia Supreme Court of Appeals, Sprinkle vs. Big Sandy Coal & Coke Co., 78 Southeastern Reporter 971.)**

Validity of Employment Contract—An agreement to employ plaintiff to do certain work in digging a slope and in driving an air course in defendant's coal mine, until defendant should begin shipping from the mine, was not unenforceable as being uncertain as to the duration of the contract. **(Alabama Court of Appeals, Barney Coal Co. vs. Davis, 62 Southern Reporter 895.)**

Injury Caused by Defective Appliance—A coal company is liable for injury to an employee caused by the company's failure to provide suitable blocks for his use in blocking cars as they descended a gravity switch to a shaft. **(United States Circuit Court of Appeals, Second Circuit; Lehigh Valley Coal Co. vs. Shondalla; 205 Federal Reporter 715.)**

Use of Dockyard by Public—A fuel company which maintains a dockyard does not impliedly dedicate any part of the premises as a public street, by merely permitting use by persons not transacting business with the company; it is necessary to show an express intent to dedicate land as a street before an implied dedication will be declared by the courts. **(Georgia Supreme Court, Savannah vs. Standard Fuel Supply Co., 78 Southeastern Reporter 906.)**

EDITORIALS

Comparatively few mining men realize the growing demand for technical knowledge and fair acquaintance with the theory and principles relating to mining, on the part of all mine officials. The man who thinks he has nothing to learn is the one, in truth, who has the most to learn. Whether we believe it or not, the man who ceases to study and read will retrograde, and must give place to his fellow worker who keeps more abreast of the times.

The suggestion that the eyesight of miners is injured by the burning of inferior oil in mine lamps, is a good one. While it cannot be doubted that certain diseased eyes develop what is known as miner's nystagmus; and that this disease is, perhaps, more common in districts where safety lamps are used exclusively, than elsewhere; it has not been proven that healthy eyesight is at all affected by the constant use of this lamp. Indeed, the evidence is to the contrary. There are too many contributory causes, in mining work, to regard the safety lamp as having any positive ill effect on the healthy eyesight of miners.

Retrospect and Prospect

The Past

One brief glance backward into the past of coal mining is sufficient to convince even the skeptical mind that the interests of the operator are those of the miner. These two factors in the coal-mining industry are indissolubly associated. It was the deepening and growing realization of the practical need of the HUMAN FACTOR in the operation of mines, two years ago, that gave birth to Coal Age. Since that time no effort has been spared by the editors to foster the growth and encourage the development of all that pertains to humanizing the operation of coal mines.

The Present

Today, the recognized cornerstone of all effort for improving conditions in coal mining is the *practical training and education of mining men.* We are glad to say that this work has received the hearty indorsement and coöperation of all the larger coal-mining companies. Many of these have organized independent educational agencies, in the mining camps and at the mines in their charge. To further this work is the constant aim of Coal Age. That we are succeeding is clear from the increasing interest of readers, and the earnest endeavors of writers for the paper, to engender an atmosphere that will, at once, help the miner and benefit the employer. The many articles written and questions discussed are encouraging men to write who never wrote before for publication; and, as a result, the "human element" in the coal-mining industry today is the recognized link that binds the operator to his employees; and the miner to his employer.

The Future

The future is bright. It promises more earnest, intelligent and united efforts on the part of all who honestly desire to improve the condition of mine workers, and establish a more safe, sound and equitable basis of operation. In that work, we, of Coal Age, hope to play our humble part.

Cancer, A Coal-Smoke Disease?

Two weeks ago, we read that tuberculosis carried away more miners than were killed by the coal industry. This we considered a severe criticism, for have we not been taught that our accident death rate was an offense against Christendom?

And now a new charge is brought against the coal industry and we learn on excellent authority that cancer is caused by the burning of coal. Charles E. Green, of Edinburgh, is first sponsor for the idea, and Sir William H. Bennett, an eminent surgeon and president of the Coal-Smoke Abatement Society, at its recent meeting, indorsed his views, as being conclusive. To quote the message:

> Sir William said that investigation had shown that the incidence of cancer was limited to those areas where coal was a staple fuel, while it was almost nonexistent where ordinary peat alone was used. The only exception yet discovered to this rule, he declared, was in districts where the peat was a hard black substance which crackled like coal and was quite unlike the ordinary smoldering peat. Sir William in conclusion spoke strongly in favor of gas as a substitute for coal.

On such flimsy evidence do the smoke abaters base their claims as if a sufficient indictment could not be drawn without resting on such clouds. The peat countries are not successful industrially; they are, therefore, largely occupied by farmers, cattle raisers, and those engaged in manual trades. Probably this has more effect than smoke on the infrequency of cancer.

As a matter of fact, if statistics are to be taken as of their face value, smoke abatement will increase rather than diminish cancer. We will not compare Arcadia with Babylon, but will balance some industrial communities, using smoky fuels, with some of those which are using anthracite, which gives no smoke.

CANCER IN 1900

City	Deaths	Population	Deaths per million people
Philadelphia	806	1,293,697	6.23
New York City	2060	3 437,202	5.99
Scranton	40	102,026	3.92
Pittsburgh	117	321,616	3.64
McKeesport	8	34,227	2.34

Note how Philadelphia, New York City and Scranton, which all use large quantities of anthracite, have higher cancer death rates than cities using smoky soft coal. We cannot say that anything definite is proved, however, because into Scranton a large percentage of foreign adults

is constantly entering, and Philadelphia and New York are both augmented yearly by grown persons, native and foreign. In consequence of that, the disease which attacks adults more than youth, may have a better chance to get in its fatal work.

The same exception may be taken to another table. Those who die by violence or consumption in their youth cannot die of cancer in their age, for death by the former is a sure preventive of a later decease by the latter. We give the table, however:

CANCER AND OCCUPATIONS PER 100,000 IN 1900

Sailors, pilots, fishermen and oystermen	113.1	Miners and quarrymen	33.4
Blacksmiths	107.3	Steam railroad engineers	30.9
Clergymen	102.2	Bookkeepers, clerks and copyists	28.0
Brick and stone masons	98.0	Saloon and restaurant keepers	28.0
Farmers, planers and farm laborers	87.7	Draymen, hackmen and teamsters	22.6
Carpenters and joiners	77.7	Compositors, printers, pressmen	22.1
All occupied males	57.1	Plumbers, gas and steam fitters	8.2

The following facts, however, will show, we think, how careful we should be in accepting the strange conclusion that clear air promotes cancer. The first three classes as a whole, live to more than the usual span of life. At 65 years of age, 55 per cent. of the clergymen are alive, 36.8 per cent. of the sailor group and 44.2 of the blacksmiths. So they live till cancer can attack and kill them. On the other hand, there are but 8.2 per cent. of the plumber group who live till 65, so they die too young for a high cancer death rate.

We are not disposed to believe that smoke causes cancer or destroys it. The imagination of the blue-sky advocates, commendable as it is, has repeatedly driven them to sensational and impossible statements.

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The Element Sulphur

The lithosphere is the name given to that *outer* part of the earth of which we have knowledge. Of the inner part we can only hazard the most uncertain guess, while of the outer ten miles, we can form a reasonably correct idea.

F. W. Clarke says that one-tenth of one per cent. of that outer ten-mile shard, called the lithosphere, is sulphur, and he estimates that about eleven-tenths per cent. of that element is found in the igneous rocks. Hence it is clear that he believes that the sedimentary masses forming 5 per cent. of the whole lithosphere contain an inappreciable amount of sulphur.

And to a certain degree that is true; though the coal-mining engineer who nearly always finds 1 per cent. in his coal and may discover nodules and flakes of pyrite which will bring the percentage up to 10 per cent., is sometimes disposed to think that sulphur is somewhat generally disseminated through the earth's sedimentary rocks. In fact not a few engineers will declare that the pyrite in coal arises from solutions which entered after the coal was formed, forgetting that if these nodules and flakes were mere sedimentations, they would probably be found with almost equal frequency wherever there were cavities in roof or floor. It is true they might not be sulphides because of the absence of methane in bituminous rocks to convert the sulphates into unoxidized bodies.

Peat and all the other forbears of coal, oil, and bituminous shale, had a power of absorbing sulphur, which element is, like carbon, a marked constituent of living bodies. It is consumed by some bacteria just as is nitrogen. It is found in all vegetation and is a component of albumen. It is found abundantly in all hair. When fecal and other matters putresce, the evil odors may be largely traced to mercaptans, of which sulphur is an important element.

In purified Trinidad bitumen also may be found 6 per cent. of sulphur, and some asphalts contain as much as 10 per cent. The natural gases of Ohio and Indiana show 0.17 per cent. of sulphur and those from California and Canada are also sulphur-bearing. The same is true of petroleums, the oils of Texas, California and Syria being sulphurous.

When discussing the presence of sulphur in sedimentary rocks, it must be remembered that easy as its presence is to determine, important as are its effects in the clay-manufacturing industry, many chemists do not seek to determine its quantity in the rocks they analyze, and their failure to list it in their reports does not prove its absence. Nevertheless the fact that it is almost never found disseminatedly present in nonbituminous sedimentaries in percentage over unity in recorded analyses shows that it is not nearly as prevalent in nonbituminous rocks as in those which are bituminous.

It is not often found in the United States even in limestones. In Pennsylvania, 110 analyses of that mineral quoted in the Pennsylvania State College report 1899-1900, averaged 0.08 per cent. of sulphur, or less than one-tenth of 1 per cent., and there were 163 analyses which ignored the element entirely. The highest analysis showed 2.43 per cent. and the next 0.314 per cent.

A careful perusal of E. C. Eckles "Building Stones and Clays" will show a like absence of sulphur. We have tabulated the analyses which he quotes, as follows:

SULPHUR IN SEDIMENTARY ROCKS

Number of Samples	Kind of Material	Average Per Cent.	Maximum Per Cent.	Number of Samples with Sulphur Undetermined
48	Slates	0.202	0.92	127
628	Sandstones	0.032	.....	0
6	Molluscan shells	0.177	0.324	.....
843	Limestones	0.102	.....	39
...	Marbles	.....	.....	1
...	Clays	.....	.....	24

A. C. Fieldner's analyses have shown how modern peat bogs are as full of sulphur as ancient coals. And this is not hard to believe, for there is, according to Warrington's "Chemistry of the Farm," almost as much sulphur as lime in the reaped part of a wheat plant. However, while the albuminous parts of all plants, the seeds, are richer in sulphur than in lime, the stalk and leaves are much richer in lime than in sulphur, so that hay, having small seeds, has 5 to 10 times as much lime as sulphur.

It is quite possible that the large beds of coal ceased growing not so much because of unfavorable atmospheric conditions and prejudicial earth movements, but from soil depletion and among the salts removed may have been those soluble sulphates necessary for plant life. The metabolism of the plant had made the sulphur in its make-up unsuited for further use in the vegetal economy.

Though the sulphur appearing as pyrite in coal is largely segregated, it does not follow, though the supposition is not wholly impossible, that it entered from the outside *after* the coal was formed; in fact, it probably entered the plant as part of its juices, remained as a sulphate or later became one, and was dissolved and deposited as a sulphide in cavities, the methane in the coal being able to achieve this chemical reaction.

BOOK REVIEW DEPARTMENT

THE COAL RESOURCES OF THE WORLD. An inquiry made on the initiative of the executive committee of the Twelfth International Geological Congress. Canada, 1913. Edited by W. McInnes, D. B. Dowling and W. W. Leach of the Geological Survey of Canada, 3 volumes, 8⅜x11¼ in., in all 1266 pp. with atlas, 13½x19½ in. with 48 maps, of which 19 occupy two pages. The reading volumes also contain several maps. Morang & Co., Ltd., Toronto, Can. Paper boards. Price $25.

This authoritative work completely covers the coal resources of the world as now known and does it, with exceptions, in a truly well balanced manner. One of the marked exceptions is the United States which receives only 16 pages for the description of its continental resources. Compared with Japan which occupies 70 and China which has 81 and Canada 86, the showing is somewhat meager but perhaps the citizen of the United States would rather buy a volume which tells him about foreign countries than one which gives him, in regard to his own, at a considerable price, what he can get for little or nothing and in more detailed form from the Geological Survey. British India is most inadequately treated in a bare 12 pages. However, as we have said, every country containing coal has its deposits described and their areas estimated in these volumes.

J. M. Gordon has severely criticised the method of classification adopted in the preparation of this book, but we cannot say we agree with his remarks. A division of coal had to be adopted such as would permit a report to be issued within reasonable time. Probably there is no country in the world where a classification could now be made on the basis of the plant life of which the coals are made up, and even if it were done, we think, it would be less useful and less instructive a classification than one based on fuel ratio or volatile content, despite all the valid objections to these methods of defining fuels.

Does Mr. Gordon seriously believe that in the future, the man on the street will order his merchant to send him ten tons of lepidodendrous or equisetaceous coal or a power user specify a fuel with a large percentage of asterophyllites? As a matter of fact, do not the age of the coal, the flow of sediments, the action of thrusts, the intrusion of dykes, the pressure and imprisonment by sediments and perhaps even the ground on which the peat-bog grew, modify the fuel more than the plant life of which it is composed?

Probably the lower Kittanning coal in Cambria County, Pennsylvania, is composed of precisely the same vegetation as the same seam in Jefferson County of the same state because the conditions under which it was produced were essentially similar and the growth in the two areas synchronous; but one is a high-carbon fuel and the other a coking coal; one is reasonably free from sulphur, the other a fuel with much sulphur impurity; one is clean, the other dirty; one smokeless, the other smoky; one disposed to break into small columnar bodies, the other large and blocky, one has no marked cleavage, the other has a well marked face and butt.

Paleobotany will never explain and delimit all these differences any more than a family tree will determine the occupation and annual income of a man. So many later influences arise that a description of a man or a chunk of coal as they now are will always be more explicit of actual qualities than a pedigree of these things can ever hope to be.

It is true, the fuel ratio does not divide coals into all the divisions the public would wish to have recognized, does not indeed separate coking from noncoking coal with precision, nor valuable from valueless fuel, but we feel that paleobotanical divisions would be far less satisfactory even if supplemented by the keenest petrographic subtleties.

We confess that we believe the classification used for this monograph is the best now available, as it does not rely wholly on fuel ratio but recognizes the effect of moisture.

The reader will be surprised to learn how generally coal is found and mined. Turkey is rarely regarded as a coal country, yet Leon Dominian states that Heraclea in Turkey produces about 827,000 short tons a year, a quantity larger than is credited to Brazil, Switzerland and Turkey in the Geological Survey Report of 1911.

Coal is found also in several parts of Ireland notably Leinster, Tipperary, Antrim, Sligo and Tyrone. Everywhere the beds appear to be badly tilted and broken by faults. Especially interesting to the coal men of the United States are the deposits of coal along the west coast of the Pacific in Japan, China and the Philippines. The coal appears to be of good quality, often containing less than one-half of 1% sulphur and not much ash. Even after the Panama canal is completed it is likely that countries of eastern Asia, will supply their own coal and may send much fuel to the United States, when their resources are thoroughly developed.

EXCAVATING MACHINERY. By A. B. McDaniel, assistant professor of civil engineering, University of Illinois, 329 pp. and index; 6x9⅜; copiously illustrated. McGraw-Hill Book Co. 239 W. 39th Street, New York. Cloth boards. Price $3.

This book will fill an important place in modern engineering libraries. It is a preëminently practical treatise on the art of excavating by machinery and gives the costs of handling by different methods and in some cases also the cost of the machinery used.

No form of excavator seems to have been overlooked. Beginning with drag and wheel scrapers, it goes on to describe graders of various kinds which push the earth before them. It then describes various forms of steam shovels including traction shovels which load by dragging along the surface.

Part II gives details relative to dredges, dry-land and floating excavators. Drag line excavators and templet and wheel ditchers are then discussed and some pages are devoted to the tower excavator and to walking dredges. The floating types treated are dipper and ladder dredges; the Löbnitz rock excavator and hydraulic dredges are also considered. Then follow the trench diggers with traveling derricks, cable conveyors and trestle tracks. Notice is also taken of the traction type of ditchers which simultaneously place the tile and backfill the ditch excavated. Levee builders also receive a chapter.

It may seem that this information is somewhat remote from the needs of mining engineers but any one who has observed the methods adopted around mines will realize that the pick, shovel and cart occupy too prominent a part because modern methods of dirt removal have not received due attention from the mine management.

Reservoirs, spurs of railroads and ditches have frequently to be built by mine engineers and in many places extensive stripping has to be done. The data in this book will serve to indicate how such work can be performed with economy and speed.

THE MINERAL INDUSTRY, Its Statistics, Technology and Trade during 1912. Edited by Charles Of. xv + 1090 pp. 6¼x9½ in., several illustrations. McGraw-Hill Book Co., 239 W. 39th St., New York. Cloth boards. Price $10.

This is the twenty-fifth publication of this comprehensive work, the first volume of the long series being produced by Richard P. Rothwell when he was editor of the "Engineering and Mining Journal." The list of contributors is so extensive and the men so well chosen for the services they render that the work merits the confidence so freely placed in it.

Every material quarried or mined is included in the list of subjects except clay and building stone. Such products of the mine as fuller's earth, gypsum, chalk, cryolite, bauxite, borax, garnet, glass sand, mica and diatomaceous earth are all considered. Coal and coke receive 38 pages beside their part in the chronology, the production tables of various countries, and the records of imports and exports. Moreover, R. H. Richards and C. E. Locke deal on the "Progress of Ore Dressing and Coal Washing in 1912" in a 67-page article, most of which is devoted to the separation of ores however. There is a 20-page bibliography treating extensively of coal and coke and general mining considerations. This bibliography is supplemental to those prepared for each mineral treated in the report.

The coal and coke division of the book was intrusted to A. T. Shurick of "Coal Age" but as no single person, however well informed can write a complete and balanced report of the whole industry in the United States, his work is supplemented by reports from their own states written by 17 separate authorities. The record of two states during 1912 is taken from the U. S. Geological Survey's advance sheets. Where new estimates of coal resources have been made, these facts are recorded under their proper headings. The coal markets are covered by three undoubted authorities. It should also be noted that the statistics and trade in foreign countries are treated with thoroughness.

SOCIOLOGICAL DEPARTMENT

Rescue Work of the Madison Coal Corporation

By James Taylor*

The Madison Coal Corporation, of St. Louis, Mo., has a mine at Dewmaine, Williamson County, Ill., which is more than usually well equipped for rescue work.

Fig. 1 shows the mine-rescue station, which is of brick and covered with a reinforced-concrete roof. The room containing the rescue apparatus measures 6x8 ft. and the first-aid and observation room covers 16x17½ ft. There is also a bathroom.

At all five plants of the Madison Coal Corporation there is an efficient rescue and first-aid corps composed of six men, who are thoroughly drilled and trained by the best of first-aid instructors. In the first-aid rooms underground, as well as in the rescue buildings, are kept Red Cross outfits, army blankets, stretchers and rubber pillows. The rescue-building equipment includes Fleuss helmets and a pulmotor.

The cars shown in Fig. 2 are kept for rescue work only, having two seats on the inside running the full length of the car. The spaces beneath these seats are utilized as tool boxes and contain all the supplies needed by rescuers, including a life line, hatchets, hammers, wire cutters and other tools and instruments of like character.

The following rescue rules have been formulated:

1. It will be the duty of the mine manager to know that the breathing apparatus in all its parts is complete and properly cared for, and by actual test, not less than once every 14 days, in the gas room of the mine-rescue building determine whether the rescue apparatus is in safe and effective condition.

2. It will also be the duty of the mine manager to know that the mine-rescue building is kept in a clean and orderly condition, that all safety lamps are properly cared for and ready for immediate use; furthermore that all supplies required in connection with rescue work are kept in ample quantities.

3. In case of fire, whether from the result of an explosion or not, stop the fan only long enough to determine the quantity of air and proper direction in which to force the ventilation so as to provide for the safety of those who may be in the mine.

4. Upon hearing the alarm of fire or the warning of an explosion, the regularly organized rescue parties will immediately go to their respective places and make prepara-

Fig. 1. Mine-Rescue Building

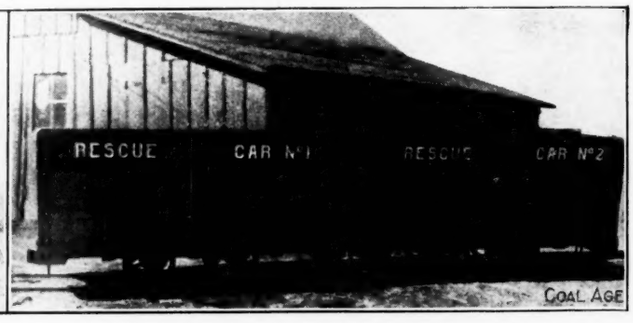

Fig. 2. Cars for Mine-Rescue Men

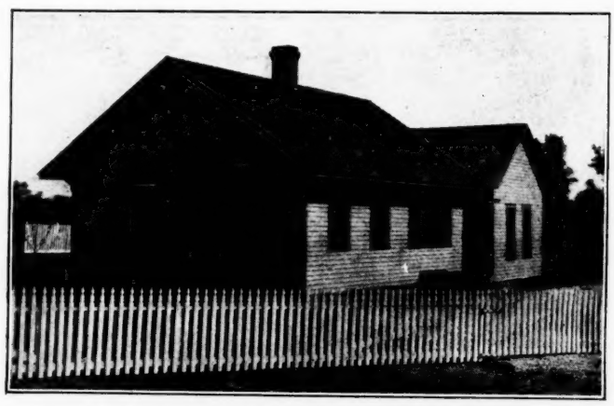

Fig. 3. Hospital Building at Dewmaine, Ill.

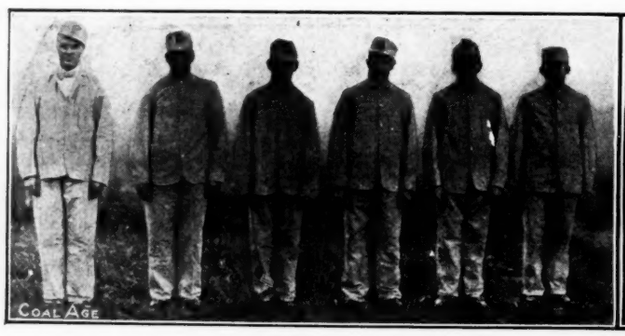

Fig. 4. No. 1 First-Aid Team

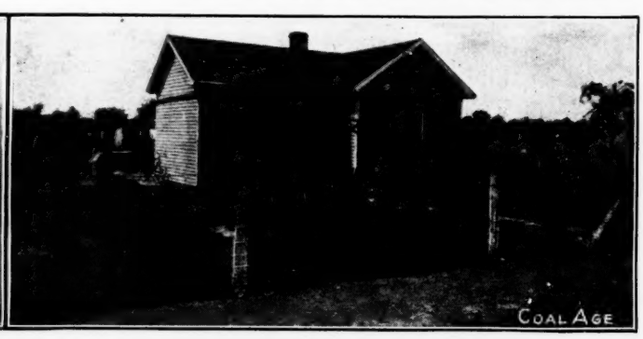

Fig. 5. Tenement Having Best Yard

*State mine inspector, Fourth Inspection District, 517 Bigelow St., Peoria, Ill.

tions to enter the mine under the direction of the district superintendent and mine manager, who will be governed by the rescue rules prepared by the manager of the Illinois Mine-Rescue Stations.

5. When the danger signals are given because of fire or otherwise, the foreman of the first-aid corps must immediately telephone to the company's physician and other doctors if necessary, and see to it that his force is ready to care for the injured.

6. Immunity from accidents in general can only be secured by all employees thoughtfully performing their duties as required by the mining laws of the state and the company's rules for the government of its mines. It is furthermore necessary that there be complete coöperation between the employees and the management in maintaining an efficient fire-fighting and rescue organization coupled with a well trained first-aid corps.

The knowledge that complete efficiency in this respect exists should bring immeasurable satisfaction to the mine workers and their families and in the most complete way possible compensate all employees for their full and active support in making this feature of the service a complete success.

A. J. MOORSHEAD,
President and General Manager.

The hospital shown in Fig. 3 is provided with all modern appliances, including an X-ray machine for locating fractures. The building is heated with hot air and will accommodate six patients at one time.

Prizes have been given for the yards making the best appearance. Fig. 5 shows the yard drawing first prize in the 70-lot village.

H. C. Frick Coke Co.'s Finals

We described, in the issue of Oct. 4, one of the preliminary meets of the H. C. Frick Coke Co., held at Trotter mine, near Connellsville, Penn., Sept. 25. The victorious team at that meet nearly succeeded in getting first place at the finals, only being ⅛ per cent. from second place and ¼ per cent. from the winning team.

The finals were held at Continental No. 1, on Thursday afternoon, Oct. 9. There were eight contesting teams, representing all the H. C. Frick Coke Co.'s mines in the Connellsville region.

The following percentages were obtained by the competing teams:

Lambert	96¼	Whitney	93 3/10
Phillips	96⅛	Redstone	93¼
Coalbrook	96	Colonial No. 1	93¼
South West	95 7/10	United	92 7/10

The teams were given the four following problems:

First or One-Man Event—First and second fingers of the left hand torn off, and compound fracture of the nose.

Second or Two-Man Event—Compound fracture of the right forearm, incised wound of the left lower leg, and concussion above the eye.

Third or Full-Team Event—Compound fracture of the left thigh and burns of the face, neck, arms and chest. Place on stretcher and carry 50 ft.

Fourth or Full-Team Event—Fractured skull, patient injured and unconscious. Fracture of four ribs on the right side and dislocation of the right ankle, and a crushed left foot.

The following are the members of the three leading teams:

Lambert—G. A. Millward, captain; Casper Schucler, Andy Mizaney, John Hatala and Samuel Rooneck.

Phillips—William Shaw, captain; Andy Secoskey, Elmer Moody, Sylvester Modjesky, Walter Kuhns, and John Donolue, substitute.

Coalbrook—Lyell Buttermore, captain; Earl Henderson, William Howe, Walter Trader and Charles Stinger.

The judges were not affiliated in any way with the competing teams and thus the contest was adjudged with complete impartiality.

Wages in Alberta, Can.

The following are the wages paid in the province of Alberta as recorded in the Annual Report of the Department of Public Works:

Outside Wages

	Per day	Hr.
Fire bosses	$110.00 to $115.00 per mo.	
Bottom man	$2.89	10
Slate pickers (boys)	1.37	10
Slate pickers (men)	2.47	10
Car oilers (men)	2.47	10
Car oilers (boys)	1.65	10
Tally boys	1.37	10
Teamsters	2.89	10
Blacksmith	3.85	10
Blacksmith's helpers	2.90	10
Power-house engineers	3.85	12
Power-house engineers	3.40	8
Fan-men	2.90	12
Hoisting engineers	3.20	8
Hoisting engineers	3.78	10
Hoisting engineers	4.40	12
Tail rope engineers	3.63	8
Tail rope engineers	3.85	10
Endless rope engineers	3.30	10
Box-car loader engineer	3.40	10
Tipple engineer	3.40	10
Screen engine tender	2.65	10
Locomotive engineer	3.40	10
Locomotive switchman	3.00	10
Fireman	2.89	8
Fireman	3.85	12
Fireman's helper	2.65	10
Railway-car helper	2.60	10
Tipple dumper (man)	2.89	10
Tipple dumper's helpers	2.64	10
Tipple dumper (boy)	1.65	10
Top cage	2.64	10
Car repairer	3.40	10
Car repairer's helper	2.90	10
Breaker engineer	3.40	10
Fan fireman	3.40	12
Machinists	$3.40 to 3.85	10
Machinist's helper	2.90	10
Ashman	2.50	10
Ashman	2.89	12
Wiper (man)	2.89	12
Coupler (man)	2.47	10
Coupler (boy)	1.65	10
Breaker oiler	2.89	11
Washer or tipple oiler	2.89	11
Breaker picker boss	2.89	10
Timber framer	3.40	10
Timber sawyer	2.64	10
Box-car shoveler	2.89	10
Breaker platform boss	2.89	10
Breaker platform men	2.60	10
Breaker screen men	2.47	10
Rock bank men	2.47	10
Dirt bank men	2.47	10
Finisher after box-car loader	2.47	10
All other outdoor labor	2.47	10
Lampman (depending upon number of lamps and skill of man	$2.47 to 2.89	8
Lampman (depending upon number of lamps and skill of man	$2.47 to 3.40	12

Beehive Coke Ovens

Leveling and drawing (6½ ton charge) per oven	$1.00
Leveling and drawing (5 ton charge), per oven	0.80
Loading into box or open cars (over 200 tons per month), per ton	0.17

Beehive Coke Ovens (Continued)

	Per day	Hr.
Loading into box or open cars (less than 200 tons per month), per ton		0.16
Seam locomotive engineer	$3.40	10
Motorman	3.18	10
Larryman	2.47	10
Plasterers	2.47	10
Carters and cleaners	2.47	10
All other labor	2.47	10

Belgian Coke Ovens

	Per day	Hr.
Ram engineman	$3.40	10
Chargers	2.89	10
Clayers	2.89	10
Drawers	2.89	10
Loaders	2.60	10

Briquette Plant

	Per day	Hr.
Engineer	$3.86	12
Briquetter	3.97	12
Briquetter's helper	3.40	12
Tar melter	2.89	12
Laborers	2.89	12

Inside Wages

	Per day	Hr.
Shotlighter	$3.30	8
Bratticeman	3.30	8
Bratticeman's helper	2.75	8
Timberman	3.30	8
Timberman's helper	3.75	8
Tracklayers	3.30	8
Tracklayer's helper	2.75	8
Motorman	3.05	8
Motorman's helper	2.75	8
Locomotive engineer	3.05	8
Locomotive switchman	2.75	8
Drivers	3.03	8
Drivers (wet places)	3.30	8
Drivers (spike team)	3.50	8
Couplers (men)	2.75	8
Couplers (boys)	1.65	8
Switch boys	$1.37 to 1.65	8
Door boys	1.10	8
Rope riders	3.03	8
Main and tail rope riders	3.30	8
Pushers	2.75	8
Buckers	2.75	8
Loaders	2.75	8
Miners	3.30	8
Miners (wet places)	3.75	8
Rock miners	3.75	8
Timber handlers	3.03	8
Laborers	2.75	8
Cagers, slope and incline	2.75	8
Cagers, shaft	3.30	8
Machine men	3.75	8
Machine men's helper	3.30	8
Pumpmen	2.75	8
Pumpmen (Dept. Nat. Res. C.P.R.)	3.20	8
Hoistmen	$3.03 to 3.30	8
Drivers (boys)	$1.65 to 2.75	8
Grippers	2.75	8
Grippers (boys)	$1.65 to 1.75	8
Pipe fitters' helpers	2.75	8
Pit carriers	$1.37 to 2.75	8
Clutchmen	3.30	8
Rollermen	2.75	8
Miners on contract average	$3.50 to 6.00	8

Development of Rescue Departments in State of Washington

The Washington Union Coal Co. has built a training station and equipped it with four Draeger Oxygen Apparatus and one Pulmotor and all other equipment necessary to train the men in helmet and first-aid work. They have also built and fully equipped an emergency hospital.

The Carbon Hill Coal Co. has added two more apparatus to their other equipment. This makes six appliances in all. The Northwestern Improvement Company has taken up the work of organizing and training rescue and first-aid teams with a greater measure of success than any of the other mining companies.

This company sent a team to the First National Mine Safety Demonstration held in Pittsburgh, Penn., Oct. 30-31, 1911. This team was made up of the following members, John Hutchinson, James Bagley, James Pascoe, John Parker and Robert McCollough, D. C. Botting, former mine inspector, acted as their subject. They were accompanied by Dr. E. G. Stimpson, chief surgeon of the Roslyn-Cle Elum Hospital Association, who is in active charge of the first-aid work for the company.

DISCUSSION BY READERS

Collapsible Stoppings

Letter No. 3—The proposition to build collapsible stoppings as a means of preventing extensive mine explosions is apparently based on the conclusion of the suggested preventative effect of increased room in the mine workings, for the expansion of the gases produced. In my opinion, such an expansive area is not always desirable or beneficial.

Under certain conditions, high and wide places in the path of the explosion, such as occur on entry turnouts or partings, have frequently checked the progress of the explosive wave by permitting the expansion and cooling of the gases. On the other hand, instances have occurred where conditions favoring the rapid expansion of the heated gases had no deterrent effect whatever on the initiation and extent of the explosion; but seemingly contributed materially to its development and force. Again, there are instances where the absence of such expansive area, under certain conditions, instead of favoring the development of the explosion, proved a potent factor in its suppression.

To illustrate this point, I would refer to the preliminary explosion tests made at the Federal Bruceton mine.* In these preliminary tests, the ignition of the coal dust was effected in an exterior steel gallery outside of the mine but connected therewith by a movable section. When this movable section was rolled to one side, thus providing unlimited expansion for the flaming gases, within 100 ft. of the initial point of explosion, there was no difficulty in obtaining a violent explosion of the coal dust in the gallery. This explosion gallery was similar, in all respects, to the one used at the Pittsburgh Testing Station. When, however, the movable section was in place, connecting the gallery with the mine and thus preventing the early and rapid expansion of the heated gases, there being no other change in the surrounding conditions, the flame was projected but feebly through the gallery and died away on entering the mine.

These facts suggest, at least, that the presence of ample room for the expansion of the heated gases, at the point where the explosion is started, may not always prove beneficial; and, on the other hand, the absence of such expansive area may not always be detrimental. The Bruceton tests would seem to indicate that the expansive area, at the point where the explosion originates, may act to increase instead of to decrease the initial energy of the blast and that greater safety is to be sought in the avoidance of such expansion, as far as practicable.

Another consideration is the fact that many of the most disastrous and extensive explosions originated in room entries where the stoppings between the entries were of a more or less temporary character and were readily destroyed by the initial blast. In many instances, a number of wide rooms connected by open crosscuts, the mouths of the rooms being unobstructed, afforded ample opportunity for a rapid expansion of the gases. But these did not prevent the development of an extensive explosion.

If there is any practical value in the suggestion of building collapsible stoppings, the theory should have received some support from the results in these instances. On the contrary, it seems that the fact is fairly well established that the easy destruction of stoppings at the point where an explosion occurs has no appreciable depressing effect on the development of the explosion.

JOHN VERNER.

Chariton, Iowa.

*Bulletin No. 56, Bureau of Mines, p. 39.

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Letter No. 4—I have been much interested in the letters so far published on this subject. In my opinion, while it may be possible for thin collapsible stoppings to localize an explosion of gas or dust, in some cases, their effectiveness will depend upon conditions in respect to the force of the explosion, the strength of the stoppings, and the amount of space made available for expansion, by the destruction of the stoppings. The condition of the workings and the gaseous condition of the atmosphere would also affect the results.

There is no question but that the concussion of a heavy, windy or blownout shot would throw down a stopping that is built too light or flimsy. Should this occur the dust thrown into the atmosphere would possibly be ignited by the flame of succeeding shots. Moreover, the short-circuiting of the air would allow gas to accumulate at the working face, which would give trouble, later, unless the danger was averted by an efficient fireboss. My belief is that it is better practice to build the stoppings in all parts of the mine of suitable strength that they cannot be damaged by blasting operations or falls of roof caused by pillar drawing.

It is the practice in the most uptodate mines, where the coal is from 3½ to 4 ft. in thickness, to build concrete stoppings 6 in. in thickness on butt headings, while those on the main cross-entries are 8 in. thick and the main-entry stoppings from 10 to 12 in. thick. In order to provide the greatest protection from falls of roof and coal, these stoppings are built at the center of the crosscut. All overcasts are made extra strong to withstand the force of a possible explosion. The thickness of stoppings, in any case, must be determined by the kind of material used, the character and height of the coal and the nature of the roof and floor, considering, also, the expected life of the stoppings. The inclination of the seam and the position of the stopping with respect to the pitch may also vary the required thickness.

As a preventive of explosions I consider it of more importance to ventilate the mine in sections, giving to each a separate split of air properly conducted to the working face; to keep all places and roadways free from gas and dust; to drive all crosscuts of ample size at equal distances apart; to use nothing but permitted explosives; and finally to inspect all shots before firing.

BENJAMIN HARTILL.

Johnstown, Penn.

Starting Fan after Explosion

Letter No. 4—Success in any operation depends on the extent and accuracy of the information available at the time. Since the Draeger and other types of rescue apparatus, and portable mine telephones have been brought to their present state of perfection, it is possible to ascertain more or less definitely the condition of the interior of a mine, with respect to fire and gas, shortly after an explosion has occurred. These means of making a rapid exploration of portions of the mine that are accessible afford the opportunity to extinguish any fires that may exist and to short-circuit any air currents that may be in circulation and which wisdom suggests should be diverted and not allowed to pass through the unexplored workings.

Speaking of this condition, following explosion in a mine, J. W. Paul, one of the most practical of the Federal Bureau's mining engineers, says:

> In the event of an explosion occurring within a mine generating large quantities of methane and containing highly explosive coal dust and plenty of dry timber, there is every probability that mine fires will be started in the timber and the coal, in different parts of the mine. Under these conditions, if the ventilating system of the mine be destroyed, there will naturally exist a real danger in starting the ventilating current through the mine. It may be assumed that the explosion originated at some point near the working face and that the stoppings in the vicinity are blown down, which will cause an accumulation of gas in the workings. * * * *"

Continuing, Mr. Paul states:

> The writer, in directing work in a mine of this character, immediately following an explosion, proceeded to advance the ventilation in stages; that is to say, by restoring the circulation only in those parts of the mine that had been previously explored by men wearing breathing apparatus. In this manner, when making the exploration, several fires were found and extinguished before the fresh air reached them.

The recent National Mine Rescue and First Aid conference, held at Pittsburgh, Penn., Sept. 23-26, 1912, adopted a number of resolutions, among which was a method of procedure in case of a mine explosion. One of the statements in this resolution reads as follows:

> (b) There should be a man in charge of outside arrangements who should see that ventilating appliances are put in readiness for operation when required.

It is evident that it was the opinion of this conference that occasions might arise when the ventilating fan should not be started immediately after being repaired, following an explosion in the mine.

Most mining men are familiar with W. E. Garforth's Rules for Recovering Coal Mines after Explosions and Fires. Mr. Garforth says, p. 41:

> Parties wearing apparatus will act chiefly as scouts, advancing ahead of the ventilation to prove the existence of and to deal with fires. Their principal and foremost duty will be, however, to relieve survivors cut off from the pit by afterdamp. * * * *

Again, on p. 44, he says:

> When the whole of the underground workings have been wrecked by an explosion it will generally be found to be the safest plan to recover the workings, in sections, by temporarily shutting off the air from all districts except the one being explored and those already recovered. * * *

And again, p. 45:

> Remember that there is likely to be fire about the point where the force of an explosion ceased, if there is any inflammable substance such as brattice cloth, doors, timber, tubs, or a feeder of gas in the vicinity.

As I understand the question under discussion, it assumes that the fan has been damaged and is stopped for repairs and there is an accumulation of gas in the mine. Referring to this question of the circulation of air in a mine, immediately following an explosion, Mr. Garforth goes so far as to say (p. 32), assuming, apparently, that the fan has not been stopped or gas allowed to accumulate in the mine:

> Having regard to the loss of life at Thornhill (139 lives lost) and Hamstead (25 lives lost) the course to be pursued seems in favor of stopping the fan, for a limited period, while an exploration is attempted; but only a knowledge and consideration of local conditions can determine the actual procedure.

Miners' Circular, No. 10, published by the Bureau of Mines, says, pp. 5 and 6:

> If the mine liberates explosive gas do not restore the ventilation in the advance workings until they have been explored by men using breathing apparatus. Any fires found should be put out before ventilation is restored, unless tests of the atmosphere within the mine indicate the absence of explosive gas.
>
> If the mine does not liberate explosive gas, it is better to restore the ventilating current at once for the benefit of any persons who may be alive within the mine.

The conditions assumed in this question call for a cool head and the exercise of good judgment on the part of the men in charge. Nevertheless, judging from the above quotations, the weight of authority appears to be in favor of not starting the fan until a preliminary examination of the mine has been made.

RALPH W. MAYER.

Roslyn, Wash.

The Safety Lamp and the Eyesight

I have noticed a number of references to the injurious effects produced on the eyesight, by the continuous use of the safety lamp, which must, if true, materially diminish the producing power of the miner. The question has been asked: Does the safety lamp injure the miner's eyesight?

As a miner who has worked in the mines for 24 years, 22 of which have been marked by the use of safety lamps of the most approved type, I want to answer this question in the affirmative. I have read carefully what each one has said, but want to suggest that anyone who believes there is no injury to the eye produced by the use of the safety lamp, should spend his next vacation in visiting a safety-lamp district in the old country. Let him go to a mine worked entirely on safety lamps and ask the superintendent if his men suffer from nystagmus, as the result of the continuous use of the safety lamp. He will certainly answer "yes," and will probably show you quite a number of men working in the yards who suffer from this disease and have had to quit the mine for good. A few only recover from the effects.

In England, the disease became so serious that the British Government placed those suffering from its effects under the Compensation Act. A miner in England who is suffering from nystagmus and unable to follow his employment is thus able to draw compensation from the company, in the same manner as though he suffered from some bodily injury received in the mine and disabling him for work. To my mind, this is conclusive evidence that the eyesight is injured by the continued use of the safety lamp and that the producing power of the miner is diminished thereby.

A MINER.

Wylam, Ala..

Building a Mine Overcast

Mine overcasts should be built of incombustible material, and in such a manner as will guarantee that they will properly perform their duty for the length of time they are expected to remain in service. No practical mine foreman or superintendent would think of erecting an overcast that will be required to last but a single year, on the same plan as he would adopt when building one expected to serve during the life of the mine.

The method of constructing a mine overcast, described in COAL AGE, Sept. 20, p. 428, is well enough when there is plenty of material at hand, such as is there mentioned. I want to describe how a mine overcast can be built cheaply of such material as is commonly at hand. At most of the mines, in this state, located on the mountains, stone is not handy, and brick and sand are almost out of the question, owing to the freight rates which forbid the use of these materials, for mine use. Necessity is the mother of invention; and, at our mines, the practice is to build overcasts in as cheap a manner as possible, using nothing having a market value, except when absolutely necessary. Iron rails, bricks and stone can be sold for other purposes, which, therefore, prohibits their use in the mine.

It is of the utmost importance that mine overcasts should be substantially constructed, in order to avoid the annoyance and trouble that are sure to develop when the air bridge leaks, allowing a portion of the ventilating current to short-circuit at this point, which would greatly impair its efficiency.

After the excavation has been made for the overcast by blasting down the roof, the space is cleared to the proper width and a dry wall laid up with the material blasted from the roof. Such a wall is built on each side of the roadway and the face of the wall coated with a mixture of cement and sifted ashes, the latter taking the place of sand. When the two sidewalls are complete, old boiler flues, that have no market value, are taken for the floor of the overcast. After these have been laid in place, they are covered with a coating of cement and ashes, to a sufficient thickness to form the floor of the overcast. When this is complete, a form is made and a sidewall built of boiler ashes and cement, on each side and above the floor of the overcast. These sidewalls are carried up to the overhanging roof. This style of overcast can be cheaply built and avoids the necessity of purchasing brick, stone or sand, which are important items in this district, since all these materials must be transported up the mountains, at a considerable expenditure of time and labor.

R. Z. VIRGIN, Supt.,
West Virginia-Pittsburg Coal Co.
Colliers, W. Va.

Study Course in Coal Mining

BY J. T. BEARD

The Coal Age Pocket Book

DEFINITIONS

Numbers—A number is the expression of one or more units or things. Numbers are classified according to their character or kind and may be defined as follows:

A Whole Number or Integer is a summation of exact units, or will contain 1 an exact number of times; 1, 9, 16, 153, etc., are whole numbers or "integers," as they are called.

A Fraction expresses a part of a unit or thing, in distinction from an integer, which always expresses the whole of anything, in units. This will be explained more fully later. Thus, ½, ⅝, ¾, etc., are simple fractions.

A Mixed Number is composed of a whole number and a fraction; as 1½, 2¾, 12¼, etc.

An Even Number is one that is exactly divisible by 2; or when divided by 2 leaves no remainder. The even digits are 2, 4, 6, 8. Any number that ends with a cipher or an even digit is an even number; as, 140, 2368, 3516, etc.

An Odd Number is one that cannot be divided by 2 without a remainder. The odd digits are 1, 3, 5, 7, 9. Any number that ends in an odd digit is an odd number; 141, 2369, 3517, etc. Beginning with 1, every other number is odd and the intermediate numbers are even.

A Prime Number is one that cannot be divided by any number, except 1, without a remainder; or, as we say has no divisor except 1. Thus, 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, etc., are all prime numbers.

Numbers are said to be "prime to each other" when they cannot be divided by the same number without a remainder. In other words, they have no common divisor. Such numbers may or may not be prime numbers. For example, 4 and 9, although prime to each are neither of them prime numbers; so also, 6 and 35; 18 and 25; etc.

A Composite Number is one formed by multiplying two or more numbers together. The numbers multiplied together are called "factors."

A Denominate Number is one of a given kind or denomination that is named; as 1 in., 10 miles, 3 yd., 25 ft., etc.

A Simple Number is one that is expressed in like units only. The numbers last named are simple denominate numbers.

A Compound Number is one that is expressed in units of different denominations; as 8 ft. 6 in., 3 hr. 20 min., etc.

A Factor of a composite number is any exact divisor of that number; thus, 3 and 5 are factors of 15, because each of them is an exact divisor of 15.

A Prime Factor of a number is any prime number that is an exact divisor of the number; thus 5 and 6 are factors of 30; but the prime factors of 30 are 2, 3 and 5.

A Multiple of a number is the product obtained by multiplying that number by another, or the result of taking the same any number of times. Thus, the multiples of 7 are: 14, 21, 28, 35, etc.

The Coal Age Pocket Book

FRACTIONS

A Fraction is a part of a whole. When a unit is divided into any number of equal parts a single part is called a "fractional unit"; and any number of those parts taken together, except the number of the division is a "fraction." Thus, a fraction is the summation of any number of like fractional units. For example, $^1/_3$, ¼, ⅛, etc., are each fractional units; while $^2/_3$, ¾, ⅝, etc., are fractions. A fractional unit is, at the same time, a fraction.

How Expressed—The division of a unit into parts is expressed by writing the number indicating the division, below a short horizontal line (—) or immediately after a diagonal line inclined upward to the right (/), the unit being written above or before the line, as the case may be. Thus, the division into 2, 3, 4, etc., equal parts is expressed as:

½, ⅓, ¼, etc.; or $^1/_2$, $^1/_3$, ¼, etc.,

which are all fractional units.

The number written above or before the line is called the "numerator"; the number below or after the line, the "denominator." These are called the "terms" of the fraction.

The Denominator of a fraction shows the number of equal parts into which the unit is divided.

The Numerator of a fraction shows the number of parts taken or expresses the number of fractional units intended.

A Proper Fraction is one whose numerator is less than the denominator, and whose value is therefore less than 1; as, for example, ½, ¾, ⅞, etc.

An Improper Fraction is one whose numerator is greater than the denominator and whose value, therefore, is greater than 1; as, for example, $^3/_2$, $^5/_4$, $^{13}/_8$, etc.

A Simple Fraction is one whose terms are both whole numbers; as, for example, ½, ⅞, $^{10}/_3$, etc.

A Complex Fraction is one that contains a fraction in one or both of its terms; as, for example

$$\frac{2\frac{1}{2}}{3}, \quad \frac{5}{1\frac{1}{2}}, \quad \frac{3\frac{1}{4}}{6\frac{1}{2}}$$

A Compound Fraction is a fraction of a fraction; or where several fractions connected by signs are expressed as a single fraction; as for example,

$$\frac{2\frac{3}{4} + \frac{1}{2}}{3 - \frac{7}{8}}$$

REDUCTION OF FRACTIONS

The Lowest Terms—In order to simplify the work, fractions should always be reduced to their lowest terms by dividing both terms of the fraction by any number that is an exact divisor of both. A fraction is in its lowest terms when the numerator and denominator are prime to each other. The fractions ⅝, $^9/_4$, $^{13}/_7$, etc., are in their lowest terms and cannot be further reduced, because the terms in each case are prime to each other.

EXAMINATION QUESTIONS

Miscellaneous Questions

(*Answered by Request*)

Ques.—There are 40,000 cu.ft. of air traveling in an airway, at an average velocity of 800 ft. per min.; what is the area of the airway?

Ans.—The circulation in a mine or airway is always given in cubic feet per minute; it is, in this case, 40,000 cu.ft. per min. Dividing this air volume per minute, by the velocity in feet per minute, gives the sectional area of the airway in square feet. Thus,

$$40{,}000 \div 800 = 50 \textit{ sq.ft.}$$

Ques.—The area of an airway is 80 sq.ft. and the amount of air traveling, 60,000 cu.ft. per min.; what is the velocity of the air current?

Ans.—In this case, the air volume in cubic feet per minute, divided by the sectional area of the airway in square feet, gives the velocity of the air current in feet per minute. Thus,

$$60{,}000 \div 80 = 750 \textit{ ft. per min.}$$

Ques.—What velocity of the air current would you recommend at the working faces to properly ventilate gaseous and nongaseous mines?

Ans.—The velocity of the air current passing the working face should always be sufficient to sweep away the gases that would otherwise accumulate at the roof or in void places. In nongaseous mines, the complaint is sometimes made that the air is too strong for comfort; while, in gaseous mines, there is danger of the flame being blown through or against the gauze of the safety lamp and heating it sufficiently to pass the flame and ignite the gas outside of the lamp. In either case, the velocity of the air current may be reduced and the gases removed effectually, by erecting suitable brattices, so as to deflect the air against the roof or into the void places.

The present anthracite-mining law of Pennsylvania restricts the velocity of air currents in gaseous mines, to 450 ft. per min., in all air passages except the main intake and return airways (Art. 10, Sec. 7). This is a fairly safe velocity where bonneted lamps are used at the face. The unbonneted Davy should not be submitted to a velocity greater than 360 ft. per min. In nongaseous mines, the velocity of the air at the working face may vary from 200 to 450 or 500 ft. per min., according to the conditions existing in the mine.

Ques.—(a) A certain airway, in a coal seam 6 ft. thick, is 8½ ft. wide at the roof, and 9½ at the floor. When the fan is running at 80 r.p.m., the anemometer shows a reading of 450 revolutions in two minutes. What is the quantity of air passing in this airway in one-half minute? (b) If the speed of the fan be increased to 100 r.p.m., what should be the quantity of air passing per minute?

Ans.—The average width of this airway, or half the sum of the top and bottom widths, is 9 ft. The sectional area is, therefore, $9 \times 6 = 54$ sq.ft., assuming that the height of the coal is the clear headroom in the airway. The anemometer is calibrated so that one revolution of the vein corresponds to 1 ft. of air travel. At this speed (450 rev.), no correction is necessary, in a good instrument.

(a) The velocity of the air current, in this case, is $450 \div 2 = 225$ ft. per min. The volume of air passing is then $225 \times 54 = 12{,}150$ cu.ft. per min.; or, 6075 cu.ft., in one-half minute.

(b) It is commonly estimated that the volume of air passing is directly proportional to the speed of the fan, which would give, in this case,

$$12{,}150 \times \tfrac{100}{80} = 15{,}187.5 \textit{ cu.ft. per min.}$$

In practice, however, the quantity of air increases in a less ratio than the speed of the fan. The fourth power of the speed varies as the fifth power of the quantity. According to this rule, the quantity of air in circulation at a speed of 100 r.p.m. would be, practically, 14,500 cu.ft. per min.

Ques.—The anemometer makes 120 r.p.m. in an airway that measures 8 ft. 6 in. at the top and 10 ft. 6 in. at the bottom, and is 7 ft. high; what is the quantity of air passing per minute?

Ans.—The average width of the airway is half the sum of the top and bottom measurements, or, in this case, 9 ft. 6 in., and its area is, therefore, $9.5 \times 7 = 66.5$ sq.ft. Except in particular cases, it is common mine practice to disregard the correction for the instrument that is sometimes used; and, in that case, the number of revolutions per minute indicates the velocity of the air current in feet per minute, if care has been taken to obtain an average reading for the airway. The volume of air passing, in this case, is $66.5 \times 120 = 7980$, say 8000 cu.ft. per min.

Ques.—Is it a fact that the pillar coal, in a well regulated mine, costs less per ton than the coal mined from the faces of the chambers, in the first working; and, if so, what is the reason?

Ans.—The coal extracted in the first working or at the faces of the chambers must generally be undermined, or side cut, or both. Under these conditions or when the coal is shot off the solid, the same weight of powder will break less coal than in pillar work; also, a greater proportion of fine coal and slack is produced, which increases the cost of production. In pillar work, when the workings have been properly planned and executed, the roof pressure can be made to greatly assist the extraction of the coal. Less powder is required and the coal is taken out in larger sizes. Much will depend on the conditions and the way in which the work is carried out.

Ques.—When extracting a range of pillars of an average thickness of 20 ft., how would you proceed with the work to insure the safety of the workmen and the security of the mine?

Ans.—Care should be taken to keep the pillar work in line and not permit the work on certain pillars to advance more quickly than that on others. It is also necessary to draw all standing timber as the work on the pillars progresses, so as to cause a uniform settlement of the roof behind the line of pillar work. The purpose of this is to relieve the pressure on the pillars and make this as uniform as possible.

COAL AND COKE NEWS

Harrisburg, Penn.

Steps will soon be taken at the auditor general's department of Pennsylvania to prepare for the enforcement of the anthracite coal tax in accordance with the act of 1913. Before Jan. 1, 1914, when the new act takes effect, every coal operator in the state will receive blank forms on which to report output to the auditor general, who is charged under the act with the collection of the tax.

The coal tax will be 2½ per cent. ad valorem prepared for market, and the reports of output must be made in January annually, covering the output for the previous calendar year. This must be made under oath, and there is a fine of $500 and imprisonment up to a year, either or both for intentional failure to make such a report, and 10 per cent. is to be added to the tax in case of such neglect or failure.

If the auditor general and state treasurer are not satisfied as to the report they are empowered to have an estimate made and to make a settlement of the tax. One-half of the tax is to be returned to the county where originating.

In order to ascertain if they had any authority to inspect the quality of the coal served customers in the state, county sealers of weights and measures sent an inquiry to Chief Inspector Sweeny at the capitol at Harrisburg and received a reply that the law does not give them any authority to inspect the quality of coal, their duties being simply to insure full weight.

A conference of sealers is being held here on the question of shrinkage. A recent law was passed giving the chief of the sealers authority to fix the limit of such shrinkage as will be tolerated.

The complaint of York manufacturers against the Pennsylvania R.R. for carrying coal from the Clearfield region to York was withdrawn at the Public Service Commission this week, and it was stated that the complaint from Lancaster along the same lines would also be withdrawn. The present rate from the Clearfield region to Harrisburg is alleged to be $1.30 per gross ton, and it is $1.50 to either York or Lancaster. The rate from the same district to Baltimore, which is 85 miles south of Harrisburg, is given as $1.60, and the same rate applies to Philadelphia. The associations from York and Lancaster claimed these rates discriminated against the towns.

There came another turn to the bitter struggle of the regulars and insurgents of the United Mine Workers of America in the anthracite section this week, when the insurgents made an appeal to a committee from the international executive board for a special convention in District No. 1. James Moran, D. A. Frampton and William Harrison, the committee that is representing the international board in hearing the appeal, is listening to both sides of the case. The insurgents alleged that the last regular convention held at Wilkes-Barre was not conducted according to the terms of the constitution and that they desire another convention. The district officers denied that there were any violations of the constitution, and in opposing a special convention, they called attention to the fact that such a session would cost the union in the district anywhere from $10,000 to $20,000. It is being whispered about that the main reason for the insurgents desiring a special convention, is that they may make a fight for the division of District No. 1 into two districts.

That the life of the anthracite industry in Pennsylvania is only 81 years, if the various estimates upon which he bases his average are correct, was the conclusion reached by M. S. Hachita, chemist of the Lehigh Valley Coal Co., in a speech made before the New York and Western Pennsylvania Coal Merchants' Association. The first estimate he quoted was that of the Geological Survey of Pennsylvania, according to which there were approximately 19,500,000,000 long tons in the ground prior to mining operations in the state. Taking an average of 40 per cent. as the proportion which can be extracted, this would leave 7,800,000,000 tons as the initial supply. Since 1820 the total tonnage mined has been 1,982,961,263, which would leave 5,917,038,737 tons still available.

T. S. Harris, in the "Forum," estimated there were originally in the ground 14,453,379,600 cu.yd., which is equivalent to 16,766,000,000 tons. By taking 40 per cent. as the proportion which can be extracted and deducting the total amount mined 4,823,438,737 tons are left available.

A. D. W. Smith, one of the commissioners of the coal-waste commission, estimated the available supply of anthracite in 1892 at 6,898,000,000 tons. Since 1,141,684,910 tons have been mined, there remains 5,564,715,090 yet to be mined.

In 1896 William Griffith estimated the available coal yet to be mined at 5,073,786,000 tons. Since then 1,096,963,635 tons have been mined, leaving 3,976,832,305 tons in the ground.

The average of these four expert estimates is 5,070,-506,217 tons.

The average annual production of coal for the last ten years has been 62,817,910 tons. If this annual average production continues until the exhaustion of the coal, the life of the anthracite industry will be only 81 years, but hard-coal production this year bids fair to reach 70,000,000 tons, and it is reasonable to believe it will increase at a normal rate in future time.

PENNSYLVANIA

Anthracite

Wilkes-Barre—Negotiations are under way for settlement outside of the courts of one of the most exceptional and unique lawsuits that has ever been brought to the attention of the courts, namely the famous case of Kingston Township against the Lehigh Valley Coal Co., to recover adequate payment for coal mined from under the surface of land in Forty Fort, which was dedicated for educational and religious purposes 145 years ago, in 1768, eight years before the outbreak of the American Revolution. This case was tried some years ago, and a verdict of $100,000 was rendered the township, but an appeal was taken to the supreme court, and it was sent back to be retried, so as to decide certain points.

Shickshinny—Failure on the part of twenty men employed at the West End Colliery of the West End Coal Co., to provide themselves with monthly buttons as called for by the United Mine Workers of America, caused a strike at the operations. District mine officials are trying to adjust the matter. Another button strike, affecting a larger number of men, is in progress at the Bliss Colliery of the D. L. & W. Coal Co., at Nanticoke, and was called when the local investigation committee started an examination of union buttons at the mouth of the shaft and found a hoisting engineer without a button. The men reporting for work refused to be lowered by this man, and as a result the colliery was thrown idle. This is the first button strike to be called at this colliery, and it is said that the union officials are backing it.

Plymouth—By a decision handed down by Judge Fuller of Luzerne Co. in the equity case of Elizabeth Sweitzer against the Plymouth Coal Co. the defendant company is enjoined from mining in the Bennett and Cooper veins within two hundred feet of the plaintiff's property. The case was brought in order to prevent the settling of the plaintiff's premises by reason of the mining operations of the defendant. The borough of Plymouth is also interested in a similar suit, and claims that as a result of the operations of the defendant its streets are sagging and its business places and homes are being ruined.

Philadelphia—Suit has been instituted for the possession of 240 shares of stock of the George B. Newton Coal Co., which recently absorbed several smaller companies in this city. Samuel B. Crowell and Jonathan P. Edwards, former owners of the firm of Roland & Bro., together with the Henry Hudson Estate, also owners of the firm of Robert Henderson & Co., contend that 240 shares of stock are due them, in addition to the $466,000 paid them for the assets and good will of their companies. The shares in dispute are on deposit with the Philadelphia Trust, Safe Deposit & Insurance Co.

Parsons—An announcement has been made that the Delaware, Lackawanna & Western Coal Co. will, in a short while, operate a new mine at Parsons, Penn. The mine will be located on the mountainside to the southwest of the town, where a hundred acres of virgin coal is still unmined. A branch road will be run from the Delaware & Hudson tracks to the new colliery.

Bituminous

Clearfield—The Madeira Hill Coal Co., which is making extensive improvements and opening a new mine in the Clover Run district of Clearfield County, expects to be able to ship coal in a short time. This firm owns 7000 acres of coal in this region.

Pittsburgh—A warrant for $218,774.50 received by the Board of Education on Oct. 10, completed the three-cornered property deal by which the testing station of the government bureau of mines, obtained the Magee High-School site. In return the school system received three sites for day schools and a cash bonus. This property deal has been in contemplation for several months past.

Windber—It has been announced that the Berwind-White Coal Mining Co. will not buy power for its new McGregor Mine in the Reitz region, but will use its enlarged power plant at mine No. 35 for this service. Additional equipment has been purchased with a view to filling the needs of the company in this region.

Brownsville—That the Vesta Coal Co. is going to start operations on the west side of the Monongahela, several miles above West Brownsville, seems to be a certainty. Recently there have been officials of the Vesta company in the vicinity of the latter location, and indications point to this place as the scene of operation.

WEST VIRGINIA

Beckley—The merging of the majority of the collieries on New River is under way according to well-founded reports. The merging of these collieries has been under contemplation for several months, and it is believed that the consumation of the deal will be realized within a short time. It is reported that the syndicate is capitalized at $100,000,000, and that $18,000,000 in cash is ready to be applied on the first payment.

Matewan—The plant of the Marvin Coal Co. was sold recently at public outcry to George Buskirk, for $17,500. No plans have been announced in reference to the operation of the plant, but it is expected that Mr. Buskirk will personally superintend future operations.

ALABAMA

Birmingham—The Mining Department of the State of Alabama reports only seven fatal accidents during September, out of probably 25,000 miners working. This is said to be the direct result of the hard, systematic work being done by this department to prevent accidents.

The Tennessee Coal, Iron & R.R. Co. states that its production for 1913 will be at least 500,000 tons more than 1912.

KENTUCKY

Louisville—The Pittsburgh Coal Co., of Louisville, has been awarded the contract for supplying coal to the Louisville Board of Park Commissioners for the ensuing year.

The Kentucky Court of Appeals recently affirmed a judgment rendered in the Bell Circuit Court against the Continental Coal Corporation and its foreman, Robert Mattingly, in the unusually large sum of $20,000, for the death of W. P. Cole in one of the company's mines. This judgment was given in a verdict and judgment for $15,000, which was reversed by the court. The court held that the latter judgment could not be said to be excessive, and found no error in the record. In this connection, the prospect of definite payments through a compensation law is of interest.

Madisonville—The Sunset Coal Mines, among other industrial concerns near Madisonville, will probably be forced to shut down shortly on account of the unprecedented scarcity of water in that section, unless heavy rains fall soon. The Louisville & Nashville R.R. is now furnishing the mines and the city with water hauled a considerable distance, but all available supplies in the vicinity of the town are about exhausted, the Ohio river at Henderson being the railroad company's source of supply.

The United Mine Workers of District 23 met at Madisonville, on Oct. 14, a large attendance from all over the district being on hand, and discussed plans for the organization of the Hopkins County coal field.

Watsonton—Watsonton, Ky., named in honor of the Watsons, who are the principal stockholders and incorporators of the Mineral Fuel Co. and the Elkhorn Fuel Co., is the latest of the new towns in the Beaver Creek section. Work on the several mining operations in that section is about completed, and it is thought that coal can be shipped out as soon as the C. & O. branch line up Beaver Creek is finished.

Owensboro—The Fern Hill Coal Co.'s properties near Owensboro, have been taken over by a syndicate headed by John B. Brasher, formerly of Madisonville, who will superintend the operations of the mine hereafter.

OHIO

Steubenville—The coal tipple and engine house of the Eastern Ohio Coal Co., at Amsterdam, was destroyed by fire recently. The loss is estimated at $20,000. The fire originated from electric wirng.

Pomeroy—The Martin Ebersbach Co., which was recently incorporated under the laws of Ohio with a capital of $250,000, to mine and deal in coal, has taken over the producing properties in the Pomeroy Bend district, which were formerly owned by the same interests as a partnership.

Columbus—T. W. Brockman, of the Coal Credit Exchange, of Detroit, was a visitor in Columbus recently. The Ralston Steel Car Co., of Columbus, Ohio, which makes coal cars, has started to erect a large addition to the plant in order to increase its output.

The coal-mining commission named by Governor Cox, of Ohio, to investigate coal mining in the state has fixed public hearings for both the operators and miners in the senate chamber, Oct. 20. At that time opportunity will be given for both sides to present their cases and evidence in support of their contentions. According to J. C. Davies, a member of the commission, it is hoped to complete the taking of evidence by Nov. 1, and to have the report completed Dec. 1. So far the commission has investigated mining conditions in the Bluefield district of West Virginia, the Indiana field and the northern and southern fields of Illinois. It has also investigated the unloading machines at the Milwaukee docks, the stoker systems at the Detroit manufacturing and electric plants, and other things connected with the industry. The conservation of Ohio's coal supply is receiving considerable attention from the commission, and a part of the report will be devoted to that phase of the question.

Alliance—Fire destroyed the tipple and other buildings of the coal mine at Bergholtz early Oct. 7. Nearly 500 men will be out of employment. The mine is sometimes called the Phillips mine and belongs to the Rice Coal Co., of Cleveland.

INDIANA

Indianapolis—The southern shipment of coal for fall and winter consumption has crowded railroad lines to such an extent that it is sometimes difficult to find power to move the coal. A blockade of cars was recently found to exist at Indianapolis and also at Terre Haute. According to railroad officials, the coal freight service will be improved at once.

Vincennes—A deal has been practically completed between Vincennes lease holders of coal lands and the Wassan Coal Co., of Harrisburg, Ill., by which the latter for a consideration of $500,000 will gain control of about 50,000 acres of coal lands with the intention of immediately opening a number of mines and giving employment to 1500 miners from the South.

Linden—The recently organized Linden Summit Coal Co. expects to open a new mine near here in a short time, and give employment to about 200 men. Work on the new shaft will be begun at once.

Clinton—Dering mine, No. 1, is the first in the Clinton field to be electrified for hoisting, as well as lighting the entries, running the machines and hauling along the main entries.

Evansville—Miners of southern Indiana are in sympathy with their striking colaborers in western and northern Kentucky in their efforts to organize. It is reported that farmers are also giving them support and that they have the assistance of the members of the American Society of Equity, an organization of farmers. Coal operators of southern Indiana, it is said, are opposed to the organization of Kentucky miners because they are forced to compete with mines that pay less than the union scale. Indiana operators protested strongly against the shot-firers' bill in the last legislature, arguing that it would be unfair to them while the Kentucky field remained unorganized.

ILLINOIS

Belleville—The cable at the Little Oak mine broke the other day just after 50 miners had been lowered in the morning shift. A car of coal was loaded on the cage, and when it was just about at the surface the cable broke. Fortunately there was no one injured seriously.

Harrisburg—The receivers of the O'Gara Coal Co. have finally sold enough receivers' certificates to pay the miners at the O'Gara mines $237,000. Some of this money has been owing for over five weeks and on account of this money being paid some of the mines will resume work.

Johnson City—The fire in the McClintock mine, which for several days got beyond the control of the miners, is now confined to a small number of entries on one side of the mine. Work has been resumed.

MISSOURI

St. Louis—In a recent report by W. P. Hawkins, fuel agent for the Missouri Pacific-Iron Mountain lines, the itemized fuel account shows that in the past fiscal year the system paid $4,500,000 for locomotive fuel alone.

OKLAHOMA

McAlester—Coal operators in the McAlester fields are not unanimous on the proposed advance in price of coal among the mines due to increased demand. Whether this price will be advanced or maintained at the prevailing quotation will depend entirely upon the individual operators.

COLORADO

Colorado Springs—The coal miners in the El Paso County districts are rapidly being unionized. The difficulties which arose some time ago when the strike began have been adjusted with one exception.

KANSAS

Coffeeville—An effort is to be made to organize a company for the purpose of developing a coal field just north of this city. It is stated that a 10-ft. bed of what is believed to be a good quality of semi-anthracite has been discovered at two different places at a depth of 40 ft.

OREGON

Coos County—The Coos County Colliers Co., of North Bend, has completed negotiations for the entire output of the Riverton Coal & Development Co.'s mine, on the Coquille River, the Libby Mine on Coos Bay, and the surplus of the Smith-Powers mine, and has contracted to supply Vancouver and Prince Rupert, B. C., parties with 24,000 tons of coal during the next six months. The same company has chartered two vessels to ply in this trade, and the first shipment will go forward from the Riverton mine in a few days, when 800 tons will be taken from the bunkers. Thereafter it is expected to ship 1000 tons over the bar at Bandon each cargo.

The Riverton Mine, one of the most extensive producers in the county, is increasing its working force, and by Nov. 1 will be operating with a double shift and producing 150 tons of coal per day.

The Libby mine will double its force, also its output, for besides the contract just entered into, the Coos County Colliers Co. has Seattle, Washington and California orders for coal shipments.

Coos County is the largest coal producing county in Oregon. The total area of its coal fields approximates 230 square miles, the character of the coal being sub-bituminous.

PUBLICATIONS RECEIVED

Department of the Interior, Bureau of Mines. "The Production and Use of Brown Coal in the Vicinity of Cologne, Germany," by Charles A. Davis. **Technical paper 55.** Fifteen pages, 6x9 in., unillustrated.

Department of the Interior, Bureau of Mines, "Monthly Statement of Fatalities in the United States, July, 1913, with revised figures for preceding months," by **Albert H. Fay.** Nineteen pages, 6x9 in., with numerous tables.

Department of the Interior, Bureau of Mines, "Mining and Treatment of Feldspar and Kaolin in the Southern Appalachian Region," by A. S. Watts. One hundred and seventy pages, 6x9 in., with many illustrations and three insert maps.

Department of the Interior, Bureau of Mines, "The Titaniferous Iron Ores in the United States: **Their Composition** and Economic Value," by Joseph T. Singewald, Jr. One hundred and forty-five pages, 6x9 in., with numerous illustrations and tables.

Department of the Interior, Bureau of Mines. "Rules for Mine Rescue and First Aid Field Contests," by James W. Paul. Miner's Circular 15. Twelve pages, 6x9 in., unillustrated.

The National Tube Co., Pittsburgh, Penn., N. T. C. Bulletin No. 17. "The Manufacture and Use of Shelby Seamless Steel Tubing." Thirty-nine pages, 8½x11 in., profusely illustrated with cuts showing the possible uses of Shelby steel tubing.

The National Tube Co., Frick Building, Pittsburgh, Penn., "The Whole Kewanee Family." Describing Kewanee unions and pipe specialties; 48 pages, 5½x8 in.; illustrated.

PERSONALS

Jabez Woolley, a wealthy coal operator of Evansville, Ind., has been selected by the Chicago & Eastern Railroad Co. to manage its $500,000 coal properties at Paxton.

W. L. Klutz, formerly superintendent of the Thomas furnace of the Republic Iron & Steel Co., at Birmingham, has been appointed general manager of the Central Iron & Coal Co., at Holt, Ala.

E. B. Sutton has been placed in charge of the rescue station at Birmingham, Ala., by the Government, and will take up his duties at once, working in coöperation with the State of Alabama Mining Department.

Herbert Jones, aged 30, prominent in the development of the New River coal field, was probably fatally shot from ambush at Oak Hill, Oct. 7. He was acting as one of the managers of the Fayette County fair.

J. Warner Shook, vice-president and general manager of the Central Iron & Coal Co., at Holt, Ala., has tendered his resignation, and will enter other business. Mr. Shook is one of the best known coal and iron men in the South.

D. S. Duncan, of the W. G. Duncan Coal Co., of Greenville, was seriously injured in an automobile accident at Graham, a few days ago. The car in which Mr. Duncan was riding turned turtle, pinning him beneath it and causing the injuries referred to.

Due to the illness of his mother, John T. White, president of the United Mine Workers of America, has postponed his trip to the anthracite coal field. He has cancelled all his engagements in this section, and notice to this effect has been sent out by the district leaders.

A. M. Healy, with his wife and family, has taken up his abode at Salt Lake City, Utah. He succeeds F. N. Cameron as Vice-President of the Consolidated Fuel Co., the Black Hawk Coal Co., and the Castle Valley Coal Co. He will have entire supervision over the operating departments.

Paul Hardy, until recently General Manager of the Island Creek Coal Co., at Holden, W. Va., has been promoted to the position of Consulting Engineer of the Island Creek Coal Co., the Pond Creek Coal Co., and the United States Coal & Oil Co. His headquarters will probably be at Huntington, although this has not been definitely decided.

F. N. Ulrich, sales agent of the Lehigh Coal & Navigation Co., has returned from a trip through the South, which he made for the purpose of opening up that territory to Lehigh coal, made possible by the recent traffic agreements between the Lehigh & New England, a subsidiary of the Lehigh Coal & Navigation Co., and lines covering various important southern points.

Peter Lobenguela, eldest son of the former King Lobenguela, who, until the British occupation of South Africa, ruled the rich domain of Matabeleland, has been found living in poverty in Pendleton, Salford, England. His identity was revealed at the Revision Court in Pendleton, where he appeared recently in defense of his vote as a British subject. In recent yers, he has been employed as a coal miner in the Agecroft mines, near Pendleton.

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC.

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The balance of the stock issued (less than 1% each) is owned by 62 employees, one ex-employee, and 11 others who are wives, daughters or relatives of employees.

There are no bondholders, mortgagees, or other security holders.

C. W. Dibble, Vice-President,
HILL PUBLISHING COMPANY

Sworn to and subscribed before me this 29th day of September, 1913.

RICHARD L. MURPHY,
Notary Public
(My commission expires March 30, 1915)

OBITUARY

John Bellas, aged 81 years, and believed to be the oldest active miner in the anthracite region engaged in underground work, died at his home in Shamokin, Penn., Oct. 9. Since he was 10 years of age, Bellas had worked in the coal mines.

Inkerman Bailey, Sr., one of the best-known operators in western Kentucky, died Oct. 10 at Madisonville, at the age of 60 years, as the result of heart failure. Mr. Bailey was for many years connected with the Reinecke Coal Co., but for the past few years he had been active in other operations, recently organizing the Big Creek Coal Co. He leaves a wife and four children.

The death of Col. John S. Holmes occurred in West Virginia, on Oct. 5. Col. Holmes was one of the best known coal operators in West Virginia. For 25 years he was superintendent of the Stevens Coal Co., the predecessors of the present Cabin Creek Consolidated Coal Co. With his two sons, William S. and Daniel S., he shipped the first coal ever mined in the Cabin Creek region.

Christopher Muckermann, 73 years old, a pioneer coal dealer, and founder of the Polar Wave Ice & Fuel Co., with 46 yards in St. Louis, died unexpectedly at his home in St. Louis after an attack of gastritis. Mr. Muckermann was born in Westphalia, Germany, and came to St. Louis at the age of 17. His father, upon arrival in St. Louis, engaged in the ice and coal business. His son followed in his footsteps and his entire life has been devoted to that business.

A. A. Sterling, aged 71, of Wilkes-Barre, died suddenly this week at his summer home, at Glen Summit Springs. His death came almost without warning, even to his intimate friends. Mr. Sterling was taken with a heavy cold, which soon developed into bronchial pneumonia, and death came four days afterward. Mr. Sterling was prominent in banking circles, and was the active vice-president of the West End Coal Co., as well as the Wyoming Valley Geological Society.

Adolphus Busch, owner of the St. Louis & O'Fallon Coal Co. mines at O'Fallon, Ill., and of the St. Louis & O'Fallon Ry. Co., died at his castle on the Rhine in Germany Oct. 10. Death came somewhat unexpectedly, as the arrangements had been made for the trip back home for the winter months. Mr. Busch was 76 years old last July, and was born in Germany. He came to the United States in 1857, settling in St. Louis. He is rated as being worth over $60,000,000, and is famous the world over as a brewer. He was a member of the G. A. R. and of many foreign orders, and was in a general way a great giver of money to various worthy causes.

CONSTRUCTION NEWS

Somerset, Penn.—Work is progressing rapidly on the big shaft of the Consolidation Coal Co., which is being sunk on the John Biesecker farm, two miles west of Jenners No. 2.

Fairmont, W. Va.—The Fairmont & Cleveland Coal Co., of Fairmont, W. Va., organized with a capital stock of $600,000, has acquired the holdings of the Parker Run Coal Co., in Marion County and will increase the output and make new developments.

Croxton, Ky.—The Harlan Coal Mining Co. is progressing rapidly on its new No. 2 operation at Coxton. This operation will be handled by the company, as distinguished from its first mine at Coxton, which was leased to the Lick Branch Coal Co., from which a good volume of coal is now being produced.

Jenkins, Ky.—The two great power plants of the Consolidation Coal Co., at Jenkins and Van Lear, Ky., respectively, are gradually extending lines to various towns and mining operations in that section, and will ultimately supply electricity to a large area in that part of eastern Kentucky. The Van Lear plant was built two years ago, that at Jenkins, which is much larger, being completed during the past summer. The latter plant cost $1,000,000, and contains five power units, capable of developing an aggregate of 6000 kw., and the company is now planning to increase this to 15,000 kw. The plant develops a pressure of 40,000 volts, the highest of any power plant in the South. A line is in process of construction between the two plants, a distance of 65 miles, so that either can supply the other with current in the event of accident.

NEW INCORPORATIONS

South Washington, Ind.—The South Washington Coal Co. has been organized with a capital of $7000 to engage in the coal business. The directors are A. A. Wallace, John Ridder, Jr., and Caspar Beale.

Clarksburg, W. Va.—The Templeton Coal Co. has been organized at Clarksburg, W. Va., to develop coal. The capital stock is $20,000, and the incorporators are J. M. Quinn, Ray Quinn, D. J. Carter, Harry W. Sheets and B. B. Jarvis, all of Clarksburg, W. Va.

Connellsville, Penn.—The Crescent Coal & Coke Co. has been granted a charter in Delaware, and will develop a tract of 122 acres in German Township, purchased from Sebastian Krado. Steps will be taken at once toward operation, but for the present at least, the company will produce only coal; but if conditions warrant, a battery of coke ovens will be built later.

INDUSTRIAL NEWS

Charleston, W. Va.—It is reported that Louis W. Adkins has sold his operations at Eagle near Boomer, and will in the future devote himself to coal ventures in other fields.

Pittsburgh, Penn.—Appalachian Coal & Timber Co., James T. Manning, president, has acquired 306,000 acres of coal and timber land in West Virginia, and will hold for developments through subsidiary companies and leases.

Charleroi, Penn.—For all the activity and confusion at Lock No. 4, they still have time to do business and surpass that of the preceding month. For the month of September the lockage of coal surpassed that of the month of August by 892,000 bu. of coal.

Washington, D. C.—The Interstate Commerce Commission on Oct. 13, suspended until Feb. 14, the proposed advances in rates on anthracite coal over the Lehigh Valley R.R. from the Wyoming coal district in Pennsylvania to Perth Amboy, N. J. The proposed advances would raise the freight rate from $1.40 to $1.55 per ton.

Atchison, Kan.—Although nothing definite can be announced, it now looks as if the negotiation looking toward the opening of a coal mine by a wealthy Eastern syndicate would reach consumation. Local men behind the deal are giving it careful and diplomatic attention, and they believe that negotiations can be brought to a successful issue.

Jenkins, Ky.—It is reported that negotiations are under way looking to the purchase by the Chesapeake & Ohio of the short branch line of the Baltimore & Ohio up Shelby Creek to the Consolidation Coal Co.'s Jenkins, mines, a distance of 28 miles. The branch referred to feeds to the C & O. route up the Sandy River, and is of great importance to that road, as more than 1,000,000 tons of coal a year move over it.

Wilkes-Barre, Penn.—Safety for employees of the mines of the Lehigh Valley Coal Co. has prompted this company to engage Evan A. Price, an expert mining man, to make a tour of the mines and report back to the company as to conditions pertaining to accidents, with a view of pointing out any faults that may come to his notice. Mr. Price will thoroughly investigate all fatal and nonfatal accidents which occur in the company's mines.

Brownsville, Penn.—The miners at the Denbeau mine of the Reliance Coke Co. have gone on strike. The men demand that the union scale as paid throughout the organized coal districts be allowed, but the operators have refused the request. The district and national organizations of the United Mine Workers are behind the miners in their demand, and a bitter fight is expected, unless the company agrees to terms. The Denbeau is a new mine, having in connection 236 modern coke ovens.

Birmingham, Ala.—John P. Harrison of Harrison-Tittswell Co., Ltd., of 66 Mark Lane, London, has placed with one of the large operators here an order for 50,000 tons of bunker coal, with the option of increasing the amount to 300,000 tons. This coal is to be used by the above company on its steamers, it being one of the largest water carriers in existence. The fuel is to be taken at the ports of Pensacola, Mobile and New Orleans. Mr. Harrison made a visit to this district and states that the collieries here were a revelation in comparison with the English mines.

COAL TRADE REVIEWS

GENERAL REVIEW

Conditions in anthracite are fairly active over the entire country, with stove coal in particular demand. The bituminous trade is holding its own with a tendency in many locations toward rising prices. The car supply is a predominating feature in Eastern and Central coal fields. Coke is, generally speaking, firm throughout all regions.

In Boston and New England generally, the anthracite market is strong. Many shippers are declining orders for stove coal unless accompanied by requisitions for other sizes. All firms appear to be well supplied with orders. The warm weather in New York has been a depressing feature in the anthracite trade, bringing the business to what is termed by some, a standstill. Nevertheless, stove coal and No. 1 buckwheat is in particularly strong demand. In Philadelphia and vicinity under adverse weather conditions, the market for anthracite does not improve as was expected. Prices, however, remain at circular level with but few rumors of concessions.

Reports on anthracite from Baltimore, Buffalo, Detroit and Chicago are all similar in tone. Dealers are buying freely, prices are well maintained, and stove coal is particularly scarce.

A week of steady fog along the northern Atlantic seaboard, has greatly shortened deliveries of bituminous coal to New England from Hampton Roads. There has been no improvement in the car supply throughout the Pittsburgh region while in northern Pennsylvania, Ohio and Indiana, generally, conditions have grown steadily worse. At Hampton Roads there is a fair accumulation of cars with but little free coal and that on hand is held for contract tonnage and Government colliers. But little change is reported anywhere in prices of bituminous. The demand throughout the South, generally, appears to be about normal. In the region tributary to the Lake trade, quotations have a general rising tendency. This would probably be decidedly augmented by a cold wave.

Lake shippers are still loading for the market of the Northwest as rapidly as possible. This condition is expected to continue until navigation closes. Warm weather in the St. Louis region has tended to break the market, but the indications are that with the possible exception of steam sizes, prices will recuperate. In some regions in Illinois and Kentucky screenings are a drug on the market, and are being either dumped at the mine or given away for freight charges.

British Columbia consumers are buying coal from the mines at Coos Bay. The practice in the past has been to occasionally import British Columbia coal to Oregon. A scarcity of fuel throughout the coming winter is predicted for this reason.

There is little change in coke conditions either as regards price or demand. A slight tendency has developed in the Connellsville region toward sagging, while throughout the Michigan and Illinois markets all grades of coke are firm.

Prices of all kinds of fuel are well maintained. What declines are recorded in certain varieties are fully compensated by advances in others. The sharp increase in the employment of railroad equipment, as shown in the new reports is an excellent index of the heavy movement of all grades of coal and coke.

BOSTON, MASS.

The Hampton Roads loading situation helped out by continuous fog along the coast. Prices firm on Pocahontas and New River but a slightly relaxed demand in New England. Distributing market dull. Georges Creek still out of the market and Pennsylvania operators beginning to feel the car shortage. Anthracite situation strong, with a heavy demand on Philadelphia, and barges in short supply.

Bituminous—A solid week of unbroken fog along the coast has served to help out the loading situation at Hampton Roads. Transportation has been practically at a standstill, and with few boats arriving there has been a chance for coal to accumulate. Most of this, however, is now going into Government colliers for the battleship cruise, and this week when bottoms begin again to arrive there will probably be further detention. Pocahontas and New River are being firmly held and on what small tonnages have been sold $3 has been the ruling price for the best grades.

The Pennsylvania coals are still in good demand, especially those of better quality. There is no marked change in the price situation, but all the shippers maintain their usual caution about selling much ahead thus late in the year. Many operations are feeling the car shortage, particularly for routings all-rail, and this is turning a larger proportion than is usual to Philadelphia for coastwise shipment. If barge transportation is short at that port for the next fortnight on account of much of it being bunched at this end it may be that prices f.o.b. will be a shade less firm than has been the case since early September.

Anthracite—The hard-coal situation in New England is remarkably strong. One or two of the leading shippers are declining to accept orders for stove size and there are many signs of a shortening up of supplies. The retail trade that started with a rush in September has so far depleted stocks that dealers are getting anxious about October and November shipments. The heaviest demand is on shippers out of Philadelphia and it remains to be seen whether a large proportion of the trade can be cared for from that quarter. It goes without saying that all the companies are well supplied with orders.

Quotations on bituminous at wholesale are about as follows:

	Clearfields	Cambrias Somersets	Georges Creek	Pocahontas New River
Mines*	$1.10@1.60	$1.30@1.70	$1.67@1.77	
Philadelphia*	2.35@2.85	2.55@2.95	2.92@3.02	
New York*	2.65@3.15	2.85@3.25	3.22@3.32	
Baltimore*			2.85@2.95	
Hampton Roads*				$2.90@3.00
Providence†				3.88@3.98
Boston†				3.88@4.03

*F.o.b. †On cars.

NEW YORK

No improvement in car supply. Cooler weather would have a quick and marked effect. Bituminous stocks at tide still below normal. Warm weather has brought the anthracite trade to a standstill. Stove and No. 1 buckwheat are in strong demand and scarce, other sizes plentiful.

Bituminous—There has been no improvement in the situation as regards the car supply during the past week, and the continued shortage is having its effect on the demand, some of which is coming from operators who are obliged to buy coal to take care of their contracts. Prices on coal for line or tide shipment have not been materially affected, though the market would probably respond quickly to any sudden pressure on the part of consumers. The continued shortage of labor and cars, the irregular operations due to petty strikes, etc., and cooler weather, are bound to have an effect in the near future. Stocks on hand at tidewater still continue to be below normal. The local market remains quotable on the following basis:

West Virginia steam, $2.60@2.65; fair grades of Pennsylvania, $2.70@2.75; good grades of Pennsylvania, $2.80@2.85; best Miller Pennsylvania, $3.10@3.20; George's Creek, $3.15@3.25.

Anthracite—The continued warm weather of the past week has brought the retail trade in and around New York City to a practical standstill. A number of the dealers, of course, still have some of their "fill-in" orders to be taken care of but the spot business which is usually looked for, about this time of the year has not as yet put in an appearance. A turn in the weather would undoubtedly stimulate business and bring in cash orders which are highly desirable to the retail dealer.

There seems to be no question that stocks in the hands of the consumers are much heavier this year than they were last. Stove coal continues to be the short size and it is getting to a point where very few of the wholesalers will accept orders for this size unless accomplished with orders for other sizes, especially egg.

Dealers in the outlying points are, where financially able, keeping their stocks to capacity taking in additional supplies as fast as they are put out. With this condition the consumers should be much better taken care of than they were last year.

In the steam sizes the pea coal is in fair demand, No. 1 buckwheat is weak, and the better grades of No. 2 and No. 3 buckwheat are quite short and in urgent demand, whereas some of the poorer grades are a drug on the market.

PHILADELPHIA, PENN.

Under poor weather conditions, the anthracite trade does not improve as quickly as was expected. Prices remain as circular with few reports of concessions. Bituminous trade still holding its own, with a tendency to higher prices.

Anthracite—The weather the past week has put a little crimp in what looked like an auspicious opening for the anthracite coal trade for the fall and winter. Wholesale as well as retail dealers state that the foggy weather has had the effect of curtailing orders, and while cancellations are not plentiful, there seems to be a disposition to hold up orders for delivery the latter part of the month.

The month of October is not likely to come up to the tonnage of last year, as there was no insistency to the trade, the mining departments were not called on to exert themselves in the way of production, but the prospects, are however good, provided there is any cold weather. This is really the important factor.

Bituminous—The bituminous trade seems to have taken on a new lease of life, not that it was by any means dead, but there has been a lack of snap and a tendency to softness for the last two or three weeks. Apparently this has disappeared. Accumulations of coal at tidewater have vanished, and there appears to be many dealers in the East who are not able to get the kind of coal they want when they want it. It looks now as if the winter will see an almost continuous period of prosperity for the bituminous trade.

BALTIMORE, MD.

The coal market generally strong. Demand covers numerous new contracts, which consumers find hard to place. Slack still a feature. Anthracite conditions active.

A gain in strength was apparently recorded by the coal market here during the past week, when connections on every side reported that prices were still on the increase and available coal growing shorter and shorter. Car scarcity is cutting a big figure in the market just now, and in both the Fairmont and Somerset regions, there were reports that mines were shipping but from one-half to two-thirds of what they could do if given rolling stock as desired. Once under way, it must be admitted, the fuel cars are being disposed of much quicker than ever before, and there is not now so much delay in unloadings and by waits on sidings as was the case in previous years.

Ordinary grades of Pennsylvania steam coal were being disposed of in small lots around $1.15 and $1.20, and cheap fuels from West Virginia were commanding about $1.05 the past week. Gas run-of-mine was worth $1.10, and three-quarter brought readily from $1.15 to $1.20. In the meantime slack took another leap and little was being let go below $1.20. The demand for this fuel seemed on the increase, with mighty little unattached in sight. The cement industry remains particularly active in inquiries for this class of coal.

The foreign movement of coal from this port should soon take a decided jump, as the past two weeks have seen a large number of new charters announced. These charters are split between South American, Cuban and southern European deliveries.

Anthracite conditions remain active despite the rather warm weather that has prevailed. Steam sizes were reported in good call. Household business should take an added impetus with the first winter weather. Deliveries are sufficient, despite car shortage in many regions.

PITTSBURGH, PENN.

Car supply unchanged, and not altogether adequate. Recent advanced asking prices easily obtained on limited tonnage available. Connellsville coke stagnant, with 1914 contracts the next important business to be negotiated.

Bituminous—Car supply has not grown noticeably worse on the average during the past week. but is not as good as 30 or 60 days ago, and coal production is in keeping with it. While the labor supply is not entirely adequate it is a minor factor compared with the car shortage. There is little free coal available, and operators find no difficulty in selling what they can spare at the advances recently mentioned over the regular circular prices of the season.

We quote for prompt and near forward delivery: Slack, $1@1.25; mine-run, $1.40@1.50; ¾-in., $1.50@1.60; 1¼-in., $1.65@1.75, per ton at mine, Pittsburgh district. There is no demand for long term contracts and the regular circular prices, have become practically nominal, these being based on $1.30 for mine-run, with slack at 90c.

Connellsville Coke—The market has been entirely colorless the past week. Demand for prompt coke has been extremely light and there has been practically no inquiry for forward deliveries. By a considerable reduction in output the free coke has been largely worked off. The market is no nearer than it was to a realization of the asking price of the majority of operators, $2.50 for furnace coke, and the only question is whether or not these operators will modify their views before 1914 contracts come to be negotiated.

In some quarters it is asserted that operators are committed to $2.50 for 1914 contracts, and will adhere to that figure even though it develops that a large tonnage will be available at lower prices. We quote the market, based chiefly upon sales made more than a week ago for October, as follows: Prompt furnace, $2.15@2.25; contract furnace, $2.25; prompt foundry, $2.75@3; contract foundry, $2.75@3, per ton at ovens.

The "Courier" reports production in the Connellsville and lower Connellsville region in the week ended Oct. 4 at 358,298 tons, a decrease of 27,196 tons, and shipments at 388,347 tons, an increase of 4981 tons.

BUFFALO, N. Y.

Market steady, with no indication or hint of immediate change. Not bituminous enough to go around and roads still cutting down their car supply. Anthracite selling in spite of the hot wave.

Bituminous—Certain of the big Pennsylvania coal roads have again cut down the car allotment, now making it 60 per cent. of the demand, which means that the mines are allowed to put out only a little more than half of what they are aiming at. There is much complaint of car shortage among the operators in the Allegheny Valley proper where they are dependent on roads in which they have no interest, but the more local coal roads, such as the Buffalo, Rochester & Pittsburgh, are said to be taking pretty good care of their shippers.

The quotations on bituminous coal are therefore as strong as ever, with no change of figures. Although there are notices of advances sent out from various centers, general survey shows that the advance is merely individual. The feeling is common that prices are high enough now. The figures are $2.90 for Pittsburgh lump, $2.80 for three-quarter, $2.65 for mine run and $2.25 for slack, with Allegheny Valley coal about 20 cents lower, except for slack, which is about on a par with Pittsburgh.

Coke—There is no improvement in the state of the coke trade. Stock coke is a trifle easier, selling freely at $3.60 at Buffalo. Best Connellsville foundry is fairly strong at $4.85 f.o.b. Buffalo.

Anthracite—With the weather about as warm as it ever is in October and remaining so for several days, the anthracite market has shown unexpected activity, all shippers in that trade expressing satisfaction in the movement. There was so little stir through the summer that it is time to move now and the weather may change any day.

As a rule the lake-shipping agents of the anthracite companies are anxious to do more business and are wondering why the amount coming forward is no larger. While the space on the upper-lake docks is not what it was early in the season there is enough to keep the fleet busier than at present. It is felt by all that it will not be easy to get too much coal west this fall. Still the amount reported at the custom house for the week was only 108,000 tons.

TOLEDO, OHIO

Lake shippers are loading as fast as possible and are complaining of the car shortage. Domestic and steam demand is good and prices are firm with prospect of rising.

Lake shippers are loading as rapidly as is possible but have been somewhat handicapped by an inability to secure coal for cargoes fast enough, owing to the car shortage which has affected coal dealers somewhat during the past month and especially coal shippers who are anxious to get all the coal up the lakes possible in the short time still remaining before the close of navigation. The demand continues good and prices are exceedingly firm with prospects of rising a little later on.

Domestic demand was extremely good during the cooler weather of a couple of weeks ago and there was some falling off the past week owing to the warmth but this condition is purely temporary. Steam coal is in splendid demand. The traffic situation is looked upon by dealers generally as threatening and local coal dealers scoff at the charges recently made by certain state officials that coal cars are being sidetracked purposely by railroads for ulterior purposes. However there is a decided shortage of cars, brought on, so local dealers say by a variety of causes. The heavy sugar

beet crop has made a big demand for cars for the transportation of sugar beets which will continue for practically 90 days. Railroads seem somewhat short of motive equipment also which has handicapped the return of empties to the coal fields. Some of the local dealers are complaining bitterly of a shortage of cars in the Pennsylvania coal fields which has greatly handicapped them in securing supplies. This they claim is not noticeable in nearly the same degree in the Ohio fields. Labor difficulties have been a source of annoyance and loss in the latter state and it is stated that there is at present fully a 60% shortage of labor.

Prices as quoted here follow:

	Pocahontas	Hocking	Jackson	Pomeroy	Massillon	Pitts. No. 8	Cambridge
Domestic lump	$2.50	$1.75	$2.50	$2.00	$2.50	$1.35	$1.35
Egg	2.25	1.20	2.50	1.75	2.50	....	....
Nut	1.80	1.20	2.25	1.75	2.50	....	....
¾ lump	....	1.35	....	....	....	1.20	1.20
Mine-run	1.60	1.35	....	....	....	1.10	1.15
Slack	....	0.70	....	....	....	0.80	....

COLUMBUS, OHIO

Despite the warm weather which has prevailed, there has been a good demand for all grades of coal in Ohio. Production is still limited by the car shortage which is growing worse in every district of the state. Prices are firm and inclined to advance. Tone of the market is good.

The feature of the coal trade in Ohio during the past week was the increasing car shortage, coupled with a good demand for all grades. The warm weather which prevailed for a greater part of the week apparently did not lessen the demand for domestic fuel to any extent and thus the trade is in excellent shape. Prices have ruled firm and no cutting of consequence is reported. Prospects for the future, outside of the smaller car supply are believed to be good.

Domestic trade is probably the strongest point in the market. Dealers stocks are generally small and they are trying to increase them for the rush which will come sooner or later. Retailers are busy with deliveries although the warm weather caused a slight lull in the retail trade. Retail prices are strong and no weakness of any consequence is reported.

Steam business is still strong and no falling off is seen in any branch of the trade. Manufacturing establishments are still taking a large tonnage and railroads are also using a fair amount. As the car shortage is mostly caused by a lack of motive power, there is some falling off in the consumption of railroad fuel. Steam prices are firm in every way. The small sizes are in good demand and prices are holding up firmly.

Production has been only fair during the week because of the shortage of transportation facilities. In the Hocking Valley the output is estimated at 60 per cent. and the same is true of the Pomeroy Bend district. In eastern Ohio the output is about 50 per cent. of the average. In the domestic fields there is a large falling off due to car shortage.

Quotations in the Ohio fields are as follows:

	Hocking	Pittsburgh	Pomeroy	Kanawha
Domestic lump	$1.75 @ 1.70	.....	$2.00 @ 1.90	$1.75 @ 1.70
3-4 inch	1.60 @ 1.55	$1.50 @ 1.40	1.75 @ 1.65	1.55 @ 1.50
Nut	1.30 @ 1.20	.....	1.60 @ 1.55	1.25 @ 1.20
Mine-run	1.40 @ 1.30	1.30 @ 1.25	1.50 @ 1.40	1.25 @ 1.20
Nut, pea and slack	0.85 @ 0.80	.....	1.00 @ 0.90	0.85 @ 0.80
Coarse slack	0.70 @ 0.65	1.00 @ 0.95	0.90 @ 0.80	0.65 @ 0.60

LOUISVILLE, KY.

Practically no change in prices and the supply of gondola cars is short. Some operators are dumping their screenings as there is no sale for this grade.

There has been practically no fluctuation in price during the past week, although there is a pronounced tendency toward even lower figures than those which have prevailed on steam coal, especially the western Kentucky variety. Just one thing is standing in the way of an equally undesirable tendency in the eastern Kentucky steam-coal market, and that is the extreme difficulty of getting suitable cars for handling this coal.

The high-side hopper car question is quite as acute as ever in this section. With the absolute refusal of consignees of domestic coal to accept the "battleships" under any circumstances, operators have been forced to load only steam coal for the larger markets, in this type of car; and inasmuch as there are relatively few consumers willing to accept these cars, even with steam coal, the market is in effect substantially narrowed, and the available supply of steam coal is limited by the supply of gondola cars to a point where it is hardly more than adequate to meet demands.

A somewhat slackened demand for steam coal has resulted from the inactivity of business in some lines. The distilleries have not yet opened up, and there is still some uncertainty as to the extent of the busy season with them; while it is reported that lack of water has caused shutdowns of large manufacturing plants in various parts of the state, and the consequent cessation of deliveries of fuel to them.

A number of mines in both of the big coal fields are dumping a large percentage of their screenings, finding it useless to ship this grade, in view of market conditions. The satisfactory movement of the domestic sizes continues, making the production of screenings much larger than there is any possible market for at present, hence the unusual procedure referred to. There seems to be no immediate prospect of relief in this connection, as there is small doubt that the demand for domestic will become larger, rather than smaller, as the season advances and really cold weather begins.

As stated, there has been no change in prices, eastern Kentucky block ranging up to $2.25 to $2.35, with screenings somewhat slow at 60 to 75 cents. There is practically no market for western Kentucky screenings in this section.

HAMPTON ROADS, VA.

Fair accumulation of cars at tidewater but little free coal. Coal on hand being held for contract tonnage and government colliers about due. Quite a fleet of bunker steamers taken care of during the week.

The dumpings over the various piers at Hampton Roads have been about normal. The New England market has taken care of practically all the coastwise shipments and while there have been some foreign cargoes there have been no extra heavy shipments either coastwise or foreign. The beginning of the week saw a large fleet of bunker steamers taken care of at all piers but toward the end of the week the supply of vessels arriving was not so heavy.

While there is a fair quantity of coal now at tidewater practically all of it is contracted for and is only held waiting for tonnage to arrive to lift it. Several government colliers are about due to take large cargoes ranging from 5000 to 12,000 tons each.

No heavy sales of Pocahontas or New River have been reported during the week. Some small lots have been disposed of, however, at from $2.85 to $3.

The demand for high volatile coal is still light. Prices quoted for this grade run from $2.65 to $2.75 with no sales reported.

Foreign cargoes for the week have been made to Canal Zone, St. Lucia, Havana, Naples and Para and Manos, Brazil.

BIRMINGHAM, ALA.

Little change in market, either lump or steam. Market on blacksmith coal fair. Practically no change in furnace and foundry coke. Pig iron quiet.

This week has brought but little change in the coal market. Domestic coal, due to the warm weather of the past ten days, is quiet for this season of the year, and the operators can hope for no better market until cool weather comes. Steam coal is rather quiet, there being some new business, but due to the large production, prices are not quite normal.

Blacksmith coal is about normal with indications of a better demand shortly. Furnace and foundry coke show practically no change over last week, fair demand at good prices, with practically no large sales.

The market on pig iron is somewhat more quiet than it has been for the past two weeks, no large sales being made, but with a fair tonnage composed of small sales. Prices are holding at $11.50 to $12 for No. 2, foundry for the balance of the year, with 25 to 50 cents advance for next year, first half.

INDIANAPOLIS, IND.

The car shortage continues and tends to stiffen prices of domestic coal, which nevertheless has a good movement into consumers' hands. Warm weather in October has been against any increased consumption of steam coal or screenings.

The car shortage that began to show itself with the opening of October, is still cause for complaint. Operators say that unless soon relieved it will have the effect of making prices higher. Some buyers say they are already paying stiffer prices but operators affirm there has been no general advance, though the market is strong. Where there has been any rise, it was on domestic lump, which is in good demand at $1.80 at the mines.

Notwithstanding the fact that October weather has been at average summer temperature, coal continues to go into consumers' cellars in a way gratifying to retailers. There is no improvement in the call for steam coal or screenings, the unusually fine weather being against them. Terre Haute is still the center of the car congestion, which seems worse on the Big Four, though the Vandalia is also a sufferer. It is not the custom of yards to lay in stocks of Indiana coal earlier than September and they prefer to wait until October. The result is that there is an aggregate demand which when it starts swamps both mines and railroads.

When corn begins to move, the mines will be lucky, if they get half as much coal hauled as they would like to have. Cold weather will also make transportation more difficult. Some mines are not being operated, yet that does not seem to have much effect in lifting the blockade. The Big Four allows a larger part of the uniform rate for coal to Indianapolis and the gas belt to the originating road than does the Vandalia, so a greater amount of coal is routed by the Big Four and the congestion is greater in its yards and terminals. There is a better movement north to Chicago, than south to Indiana points, it is said. The advance in domestic coals at the mines has been 10c. and 15c., a total of 25c. since Sept. 1. This was promptly added to the retail prices, but the latter have not been changed since Sept. 20.

DETROIT, MICH.

Strength is the predominating feature of the local coal market and this with the car shortage is tending to raise prices. Anthracite is not plentiful and stove size is particularly scarce. Coke prices are firm.

Bituminous—The steam situation in and about Detroit is very active. No slacking off of any consequence is noticeable at the present time, there being a steady demand for steam grades from all the large manufacturing plants which will continue throughout the balance of the year. This will have a tendency to bring the market toward higher levels. Local operators claim that the production has been slightly curtailed over the previous week. This condition seems more acute in the Hocking Valley district where the car supply has probably not been the best; the output has probably not been over 70 per cent. of the normal.

Generally speaking, strength is the chief feature of the coal trade in Detroit. Demand for all grades is running along steadily, which together with the growing car shortage is making quotations firm in every respect. The volume of business that can be done here at the present time is entirely at the mercy of the car supply, which seems to be growing steadily worse, so far as this vicinity is concerned. Tone seems to be satisfactory and the future prospects bright.

Quotations are as follows:

	W. Va. Splint	Gas	Hocking	No. 8 Ohio	Cambridge	Jackson Hill	Pocahontas	Semi-Smo.
Domestic lump..	$1.75					$2.50	$2.75	
Egg.....	1.75	.....	.....	.....	.....	•2.50	2.75	.....
Nut.....	1.60	.....	.....	.....	.....	.....	.....	.....
Steam lump....	1.30	.....	.....	.....	.....	.....	.....	.....
¾ lump.....	1.25	$1.25	$1.25	$1.20	$1.15	.....	.....	.....
Mine run.....	1.10	1.15	1.15	1.10	1.10	.....	.....	$1.00
Slack.....	0.90	0.95	0.75	0.80	0.80	.....	.....	0.85

Anthracite—This fuel is not as plentiful in the Detroit market as it was some time ago. Stove sizes are especially scarce and dealers are urging their customers to take a mixture of egg and stove. Jobbers are not hesitating to ask a premium of 35c. per ton for stove anthracite. The other sizes do not seem to be coming along in great abundance. The scarcity of box cars is given as reason for the slight shortage on hard coal and certain operators are asking permission of the dealers to ship their anthracite in open cars.

Coke—Prices on coke especially Semit-Solvay and gas are very firm. Semit-Solvay is being quoted at $3.70 and gas house at $3.25 ovens. The above cannot be said of Connellsville, because in some instances the foundry size has been quoted as low as $2.50 per ton.

CHICAGO

The coal trade throughout Chicago continues to be brisk. A number of the operators are sold up to Dec. 1. There is a heavy demand for steam coal and current orders absorb about all of the available supply. Retail dealers in anthracite are buying freely. The coke market remains firm.

All departments of the coal trade in Chicago are on an exceptionally satisfactory basis. There is an unusual demand for Hocking coal and some of the operators have sufficient orders on hand to keep them busy until Dec. 1. None have any free coal. The price of $1.75, the mines, continues firm. Additional strength is being displayed in the coke market, a wide demand for the by-products being noted.

Good prices are being obtained for domestic lump on spot business although a considerable quantity of low-price lump is being received. A large volume of orders is being placed by retail dealers for anthracite coal. Reports furnished by selling agencies disclose that the sales last month were the largest on record and that all indications point to exceptionally heavy business throughout the current month.

Smokeless lump and egg is being offered at $2.50, the mines. The mine-run price remains variable, ranging between $1.40 and $1.50. A new circular price of $2.25, the mines, is being quoted by producers in Franklin County, but there has been no recession in buying. No Carterville coal is being sold for less than $2, the mines, and the operators have about all the business they can conveniently handle. The price for Springfield domestic lump remains firm at $1.75. Screenings are selling at from 45c. to 55c. for the lower grades and from 70c. to 75c. for the higher product.

Prevailing prices at Chicago are.

	Springfield	Franklin Co.	Clinton	W. Va.
Domestic lump.....	$2.57	$3.05@3.30	$2.52	
Steam lump.....	2.07		2.07	
Egg.....		3.05@3.30		$4.30@4.45
Mine-run.....	1.97	2.40@2.55	1.87	3.45@3.55
Screenings.....	1.27@1.32	1.75@1.85	.22@1.32	

Coke—Connellsville, $5.50; Wise County, $5.25@5.50; by-product, egg, stove and nut, $4.85; gas house, $4.65@4.75.

ST. LOUIS, MO.

Warm weather had a tendency to break market, but indications are it will regain. Steam sizes breaking and in the Standard field is given away for freight charges.

A drop in temperature the early part of the present week saved the coal market from going to pieces. As it was, the latter part of last week conditions were very bad locally with a tendency to cover the country market also.

Standard ¾-in. slack was given away for the freight charges, and when it became known the latter part of last week that the O'Gara miners had been paid, the screenings market on high grade fell off in Chicago, which, of course, affected St. Louis to the extent of 10 or 15c. a ton; and as a matter of fact, all sizes dropped.

Franklin County that had been up to $2.25 in our last report, dropped down to $1.75 with a maximum of $2. Carterville got down to about $1.60, as the minimum on domestic sizes, and No. 3 and No. 4 washed went down to $1.05.

The colder weather of this week, however, has strengthened the domestic market some but the steam market is very unsteady. This is a condition that will likely continue now for some time.

The prevailing market f.o.b. mines is as follows:

	Williamson and Franklin Co.	Big Muddy	Mt. Olive	Standard
2-in. lump.....	.....	.....	.....	$1.10@1.15
3-in. lump.....	.....	.....	$1.40@1.50	.....
6-in. lump.....	$1.75@ 2.00	.....	1.50@1.60	1.35@1.45
No. 1 nut.....	1.35@ 1.50	.....	.....	.....
Screenings.....	0.50@ 0.55	.....	.....	0.10@0.15
No. 1 washed nut.....	1.25@ 1.35	.....	1.40	.....
No. 2 washed nut.....	1.60@ 1.85	.....	1.60	.....
No. 3 washed nut.....	1.10@ 1.15	.....	.....	.....
No. 4 washed nut.....	1.10@ 1.15	.....	.....	.....
No. 5 washed nut.....	0.25@ 0.30	.....	.....	.....

PORTLAND, OREGON

British Columbia coal consumers buy from mines at Coos Bay, Oregon, whereas practice has been occasionally to ship coal from British Columbia to Portland. Scarcity of coal predicted for the winter for various reasons.

News has been received that the Coos County Colliers Co., of North Bend, on Coos Bay, Ore., has completed negotiations for the sale of the entire output of the Riverton Coal & Development Co.'s mines, on the Coquille River, the Libby mine on Coos Bay, and the surplus of the Smith-Powers mine in that vicinity, to Vancouver and Prince Rupert, B. C., parties. The quantity will aggregate about 24,000 tons. This is the first instance known where Oregon has shipped coal to British Columbia. In past years it has occasionally been the practice to import coal here from the mines across the line to the north.

The Coos County Colliers Co. is reported as having chartered two vessels to carry the coal, the first shipment to be made at once. The Riverton mine will shortly begin the operation of double shifts and produce 150 tons daily. The Libby mine, too, will put on a night shift. In addition to the above orders, the mines have contracted with Seattle and California buyers for about 10,000 tons of coal.

As a result of the strike troubles in British Columbia prices on Washington coals have advanced during the past two weeks from 25 cents to 50 cents per ton, and indications are that they will go higher.

Following are prices in Seattle on staple and established coals at city bunkers:

Grand Ridge, lump, $5; nut, $3.50; Newcastle, nut, $3; lump, $5; Black Diamond, mine run, $4.25; lump, $7; South Prairie, mine run, $4.25; lump, $7; Renton, nut, $4; lump, $5.

Washington coals in the Portland market, delivered to consumers are quoted as follows: Newcastle, nut, $6; lump, $7; South Prairie, lump, $9.50; Black Diamond, $9.50.

Rock Spring, Wyo., is quoted at $9.50 for nut and $10 for lump, Utah egg is quoted at $9.50, and Australian, what little there is here is quoted at $10.

PRODUCTION AND TRANSPORTATION STATISTICS

COAL MOVEMENT

The following is a summary of the movement of coal and coke over 13 principal railroads during June and the first six months of this year in comparison to last year, in short tons:

	July		Seven Months	
Anthracite	1912	1913	1912	1913
Baltimore & Ohio[1]	122,214	80,404	825,636	839,103
Chesapeake & Ohio[1]	789	1,571	17,268	10,346
Erie[2]	715,621	765,140	1,008,675	4,970,188
Pennsylvania[1 2]	952,741	719,944	5,525,010	6,138,175
Virginian[3 1]	.....	100	20	809
Total 5 roads	1,791,365	1,567,159	10,376,609	11,958,621
Bituminous				
Baltimore & Ohio[1]	2,648,032	3,089,536	19,396,094	20,645,446
Buffalo, Roch. & P.[1 3]	623,864	806,763	4,576,317	5,367,876
Buffalo & Susq.[1 3]	100,130	147,616	817,159	1,051,151
Chesapeake & Ohio[1]	1,400,867	1,390,703	10,317,818	9,371,471
Erie[1]	18,306	9,616	176,552	283,868
Hunt. & Br'd T. Mt[1 3]	54,986	112,143	694,181	785,938
New York Central	486,385	721,614	4,412,889	5,190,466
Norfolk & Western[1 3]	1,999,250	2,148,250	13,065,813	13,579,702
Pennsylvania[1 2]	3,655,387	4,551,528	26,175,168	28,833,947
Pitts. & Lake Erie[1 3]	1,129,555	1,130,003	6,156,833	7,431,716
Pitts. Shaw. & North.[1 3]	140,325	233,664	1,074,208	1,558,512
Virginian[1 3]	245,087	331,626	1,997,365	2,522,659
Western Maryland	193,282	197,122	1,662,419	1,699,088
Total 13 roads	12,695,456	14,860,184	90,522,116	98,321,840
Coke				
Baltimore & Ohio[1]	368,720	391,485	2,703,015	2,499,815
Buffalo, Roch. & P[1 3]	49,863	42,962	283,352	339,887
Buffalo & Susq.[1 3]	24,965	24,604	146,711	180,026
Chesapeake & Ohio[1]	19,976	29,945	145,887	210,483
New York Central	9,598	580	50,358	36,207
Norfolk & Western[1 3]	97,227	106,351	839,439	946,993
Pennsylvania[1 2]	1,077,047	1,183,070	7,451,340	8,569,978
Pitts. & Lake Erie[1 3]	495,675	494,053	3,530,218	4,119,403
Pitts. Shaw. & North[1 3]	.....	.....	5,155	9,383
Western Maryland	5,556	4,317	40,531	44,410
Total 10 roads	2,148,627	2,277,367	15,196,006	16,956,585
Coal and Coke, 13 Roads				
January			16,421,839	18,936,646
February			17,787,331	17,546,496
March			19,483,025	17,631,345
April			13,429,367	16,850,690
May			15,635,568	18,986,796
June			16,702,153	18,580,363
July			16,635,448	18,704,710
August			18,396,247	.....
September			17,432,358	.....
October			18,712,657	.....
November			17,815,767	.....
December			17,929,632	.....
Total, 12 months			206,381,392	

[1] Includes coal from connecting lines.
[2] Does not include company's coal hauled free.
[3] Includes company's coal.

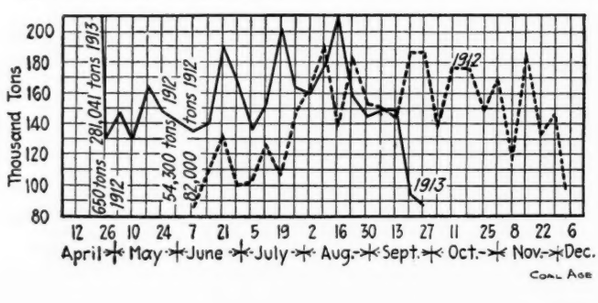
Note.—Southern Railway handled 338,648 short tons of coal during July and 2,409,598 short tons during the 7 months ending July.

ANTHRACITE SHIPMENTS

The following is comparative statement of the anthracite shipments for September and the first nine months, of the years 1912-13, in long tons:

	September		9 Months			
	1913	1912	1913	%	1912	%
Phila. & Reading	888,060	1,184,594	9,504,550	18.54	8,950,472	19.96
Lehigh Valley	1,031,876	1,168,649	9,671,928	18.86	8,287,807	18.49
Cent. R.R. N. J.	788,038	691,253	6,795,406	13.25	5,830,831	13.00
Del. Lack. & West.	834,345	835,316	7,357,984	14.35	6,354,946	14.17
Del. & Hudson	605,071	579,792	5,303,075	10.34	4,536,977	10.12
Pennsylvania	533,439	521,741	4,610,332	8.99	3,948,019	8.81
Erie	669,364	683,026	6,119,302	11.93	5,303,084	11.83
Ont. & Western	222,086	212,125	1,919,308	3.74	1,623,083	3.62
Total	5,572,279	5,876,496	51,281,885	100.00	44,835,219	100.00

Stocks at Tide on Aug. 31 were 575,385 tons as compared with 537,404 tons on July 31.



FOREIGN MARKETS

GREAT BRITAIN

Coals—Best Cardiff coals are fairly well "stemmed," and the price is about unchanged, but all other descriptions of large and small are in good supply for prompt loading and prices have an easier tendency. Colliery owners, while making concessions to immediate buyers, are reluctant to modify forward quotations.

The prices for Cardiff coals are f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport; both net, exclusive of wharfage, and for cash in 30 days.

Prices are approximately:

Best Welsh steam	$4.74@4.87	Best Monmouthshires	$4.07@4.14
Best seconds	4.38@4.56	Seconds	3.98@4.02
Seconds	4.38@4.44	Best Cardiff smalls	2.43@2.56
Best dry coals	4.38@4.63	Seconds	2.25@2.37

Freights—Tonnage is offering more freely and chartering is fairly active. Rates show some signs of weakening a little.

Quotations are as follows:

Gibraltar	$2.06	Colombo	$3.22
Malta	1.88	Sabang	3.22
Marseille	2.73	Singapore	3.40
Algiers	2.49	Las Palmas	2.24
Genoa	2.37	St. Vincent	2.43
Naples	2.43	Rio de Janeiro	4.30
Alexandria	2.37	Buenos Aires	5.28
Port Said	2.31	Santos	5.11
Aden	2.80		

COAL SECURITIES

The following table gives the range of various active coal securities and dividends paid during the week ending Oct. 11.

	Week's Range			Year's Range	
Stocks	High	Low	Last	High	Low
American Coal Products	....	....	80	87	80
American Coal Products Pref.	....	....	105	109½	105
Colorado Fuel & Iron	31¼	27½	27½	41½	24½
Colorado Fuel & Iron Pref.	....	....	155	155	150
Consolidation Coal of Maryland	102¼	102¼	102¼	102¼	102¼
Lehigh Valley Coal Sales	210	200	210	....	....
Island Creek Coal Com	51½	51	51	53½	47¼
Island Creek Coal Pref.	84½	84	84	85	80
Pittsburgh Coal	22½	19½	20⅜	24⅜	14½
Pittsburgh Coal Pref.	92	86½	88	95	73
Pond Creek	22¼	21	21	23¾	16½
Reading	163	159¼	160	171	151½
Reading 1st Pref.	....	....	82½	92½	82½
Reading 2nd Pref.	91½	91	91	95	84
Virginia Iron, Coal & Coke	45	44	44	54	37½

	Closing Bid	Asked	Week's Range or Last	Sale	Year's Range	
Bonds						
Colo. F. & I. gen. s.f.g. 5s	95	98	98	Sept. '13	93½	99¼
Colo. F. & I. gen. 6s	104	104½	107½	June '12	..	..
Col. Ind. 1st & coll. 5s. gu	80½	81	80½	81	77½	85
Cons. Ind. Coal Me. 1st 5s	..	..	76	Aug. '13	76	76
Cons. Coal 1st and ref. 5s	..	92½	93	Oct. '12	..	..
Gr. Riv. Coal & C. 1st g 6s	..	..	102⅜	April '06	..	..
K. & H. C. & C. 1st s f g 5s	91	..	98	Jan. '13	98	98
Pocah. Con. Coll. 1st s f 5s	85½	86	85½	Sept. '13	85	87½
St. L. Rky. Mt. & Pac. 1st 5s	77	78	78½	Sept. '13	73	80½
Tenn. Coal gen. 5s	98½	99	99	99	98½	103
Birm. Div. 1st consol. 6s	..	101⅞	101⅜	Sept. '13	100⅜	103
Tenn. Div. 1st g 6s	..	102	102	Sept. '13	100¼	102
Cah. C. M. Co. 1st g 6s	..	..	103	July '13	103	103
Utah Fuel 1st g 5s	..	..	..	....	..	..
Victor Fuel 1st s f 5s	..	80	80	May '13	79½	80
Va. I. Coal & Coke 1st g 5s	92½	93½	92⅞	93	92	98

Burns Brothers—Dividend No. 1 on the common, 1¼% and No. 3 on the preferred, payable Nov. 15 and Nov. 1, respectively.

Pacific Coast Co.—Dividend of 1½% on the common and second preferred and 1¼% on the first preferred, all payable Nov. 1.

Colorado Fuel & Iron Co.—For the year ended June 30 last this company reports a surplus after charges of $1,727,192 which is sufficient to meet the regular dividend of 8% on the $2,000,000 preferred, together with the 75% back dividends due, and still leave a substantial amount over. The back dividends now amount to only 40%, as 35% was paid in March of the current year.

The National Bituminous Coal & Coke Co. (Washington, D. C.)—The bonds of this company are secured by a first lien on about 52,000 acres of coal land and coal rights in West Virginia, 44,800 acres of which are owned in fee. There are eight operations on the property at the following points: Gauley, Peerless, Cedar Run, Crown Hill and Eskdale. The company has large holdings in the Pocahontas field. The production is contracted for up to March, 1914.